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VOLUME XIII.
NUMBER 8.

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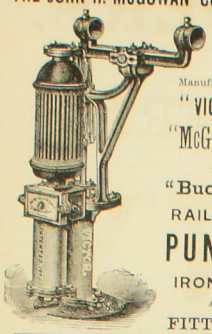

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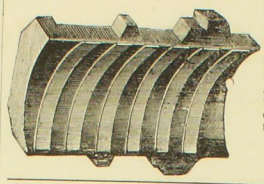

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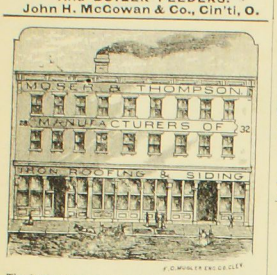

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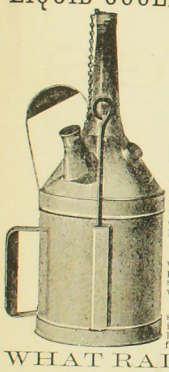

The attention of those who are running heavy journals is respectfully invited to the above Liquid Cooler. It has been successfully used for upward of ten years, and is constantly growing in favor as its merits become known, and we are confident that practical men cannot fail of being convinced that our preparation deserves their candid attention. What we claim for it is:

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Only Preparation that will Cool a Hot Journal

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Every Railroad Train or Steamboat

should have a can of the Liquid Packing on board, with the directions for its use pasted upon it, and thus have always at hand the means of effectually cooling a hot journal, and thereby avoid the expense, danger and trouble from this cause.

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P. NOYES, Agent.—*Dear Sir;* Please send for account of Eastern Railroad five barrels Liquid Cooler.

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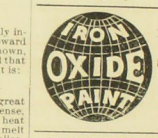

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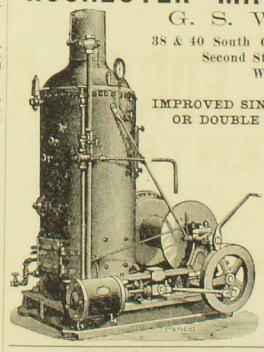

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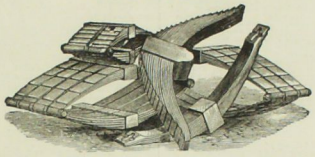

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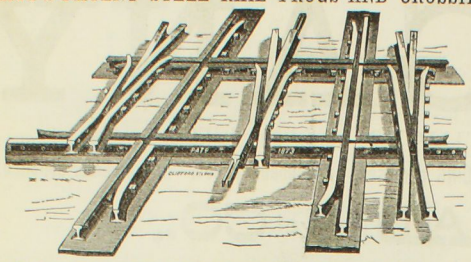

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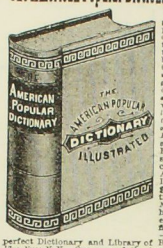

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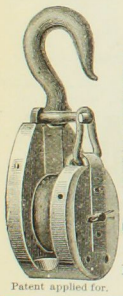

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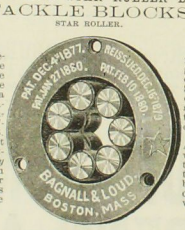

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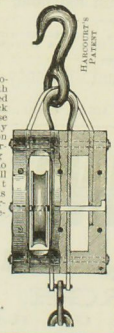

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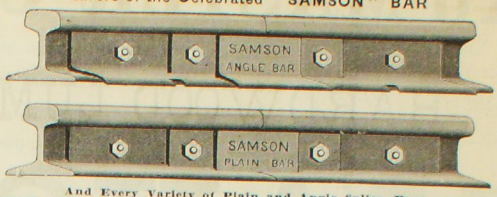

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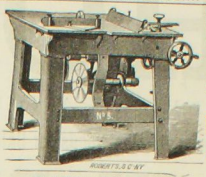

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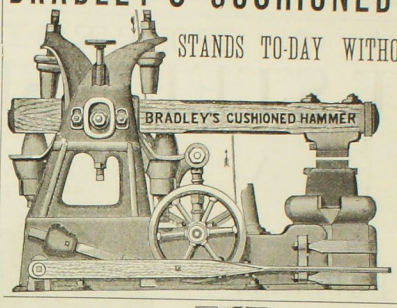
STANDS TO-DAY WITHOUT AN EQUAL.



It approaches nearer the action of the Smith's arm than any hammer in the world.

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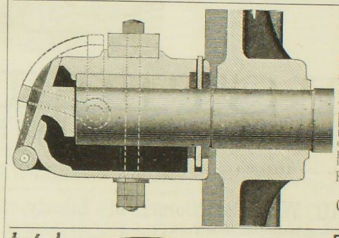

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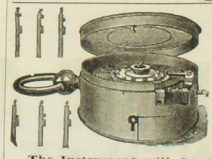

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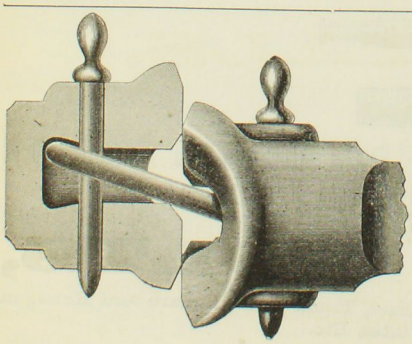

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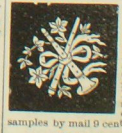

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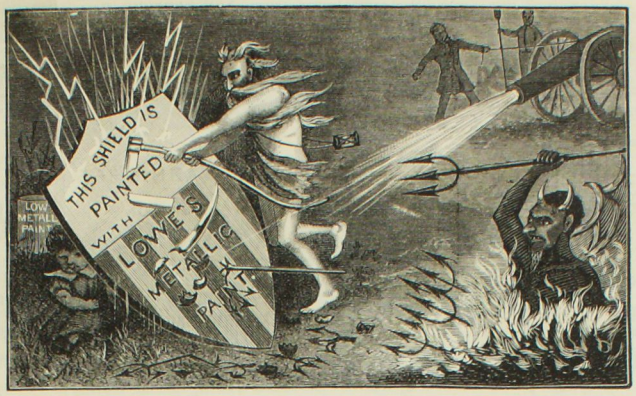

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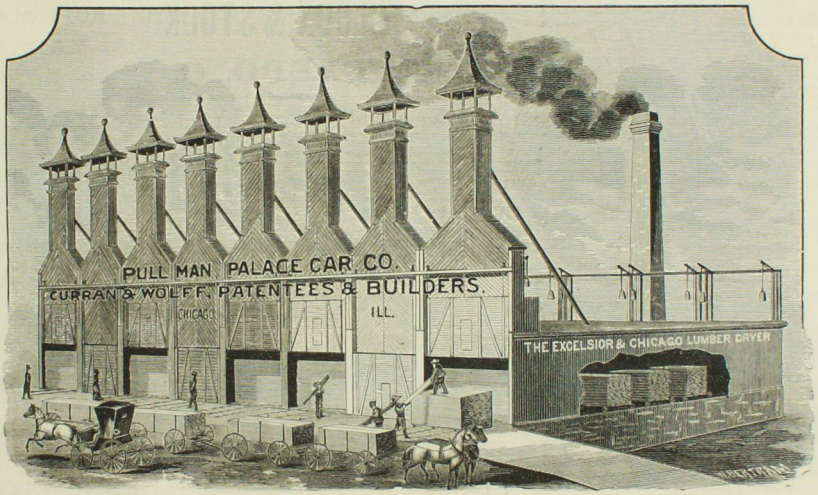

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Louisville & Nashville Railroad, Louisville	2
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Denver & Rio Grande Railway, Denver, Col	2
U. S. Rolling Stock Co., Chicago	2
Chicago, Burlington & Quincy R. R., Aurora, Ill	2
Southern Car Works, Knoxville, Tenn	1
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Atchison, T. & S. Fe Railway, Topeka, Kan	2
Barney & Smith Company, Dayton, O	4
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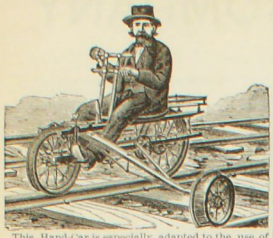

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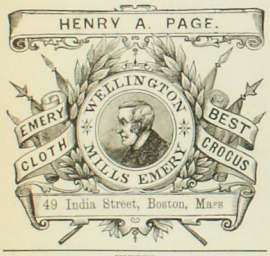

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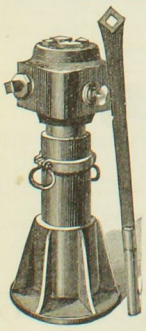

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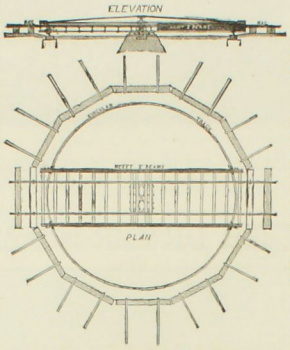

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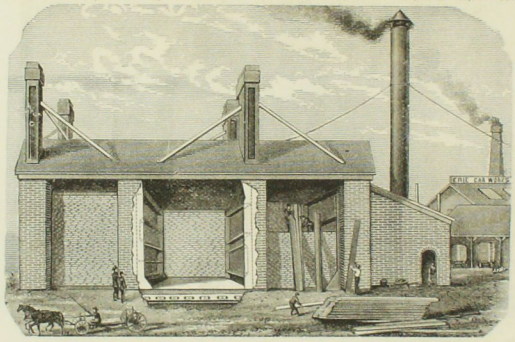

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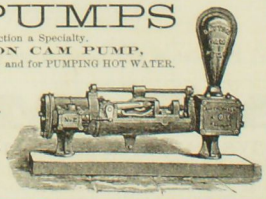

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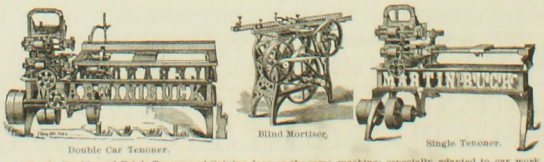

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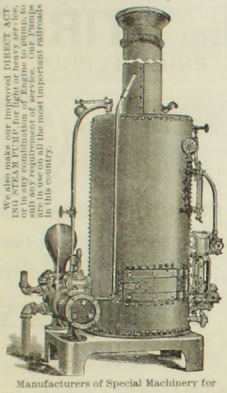

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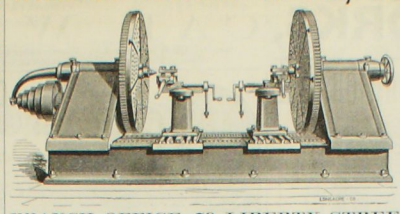

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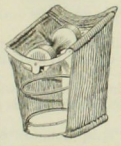

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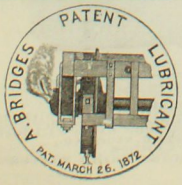

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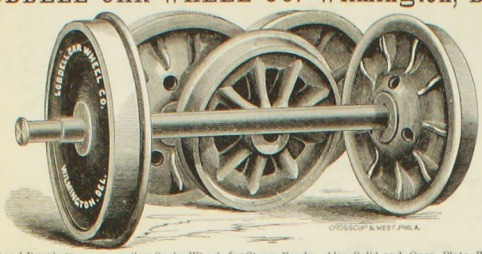

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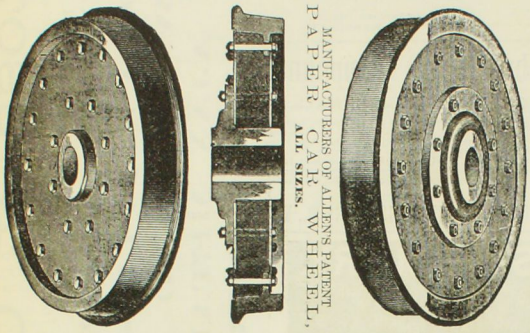

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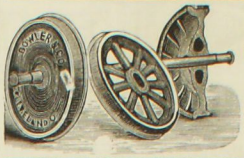

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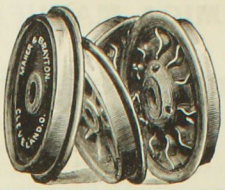

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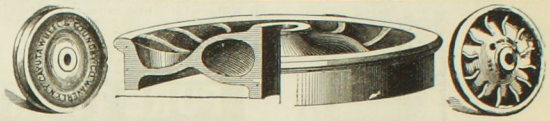

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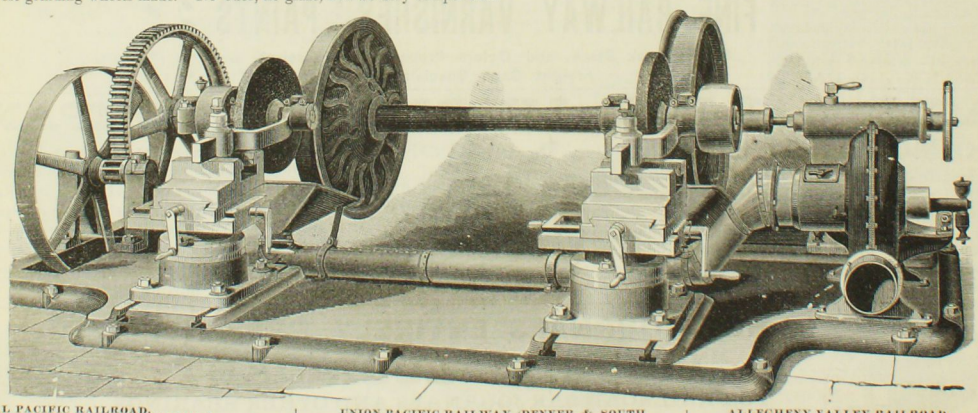

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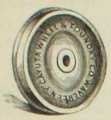

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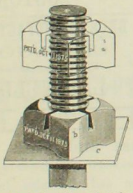

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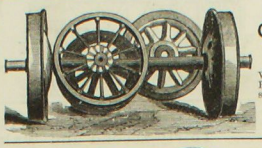

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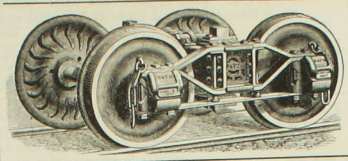

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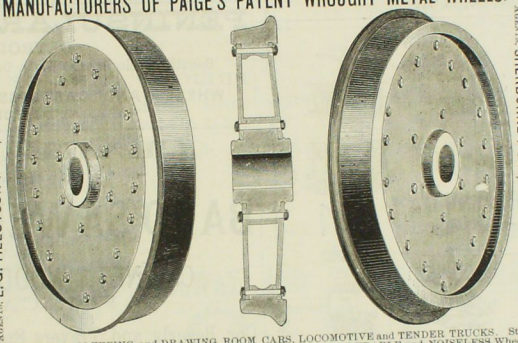

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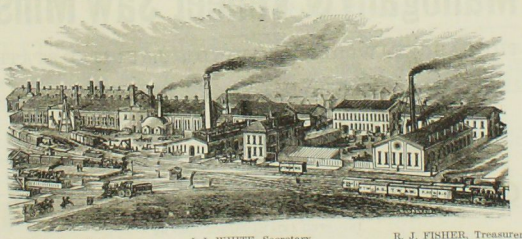

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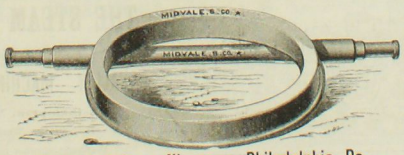

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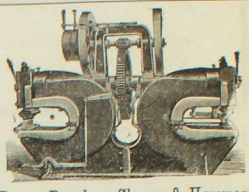

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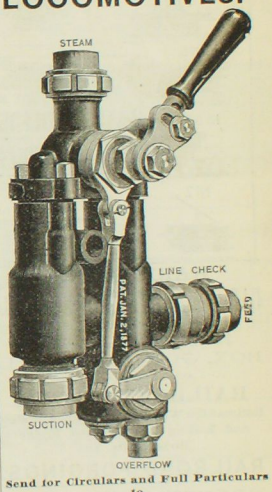

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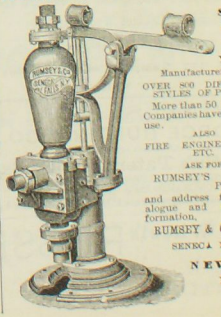

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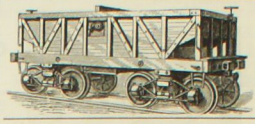

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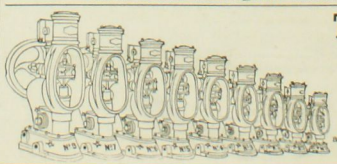

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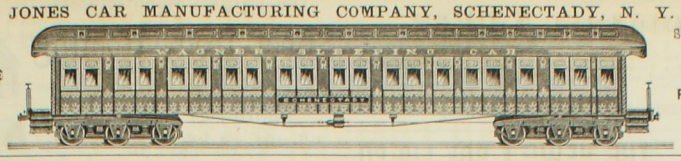

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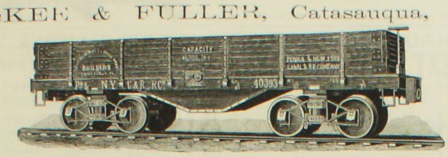

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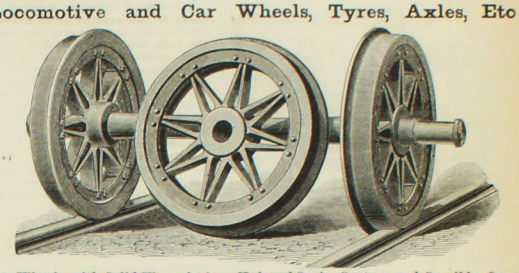

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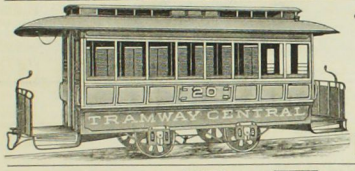

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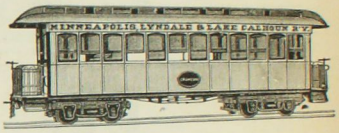

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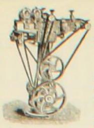
The most perfect Machine in use.



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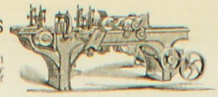
Five different styles and sizes. These are especially adapted to all classes of car work.



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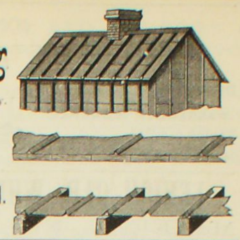

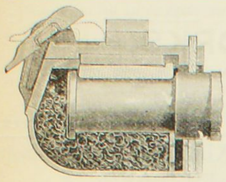

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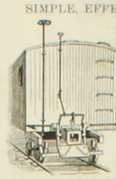

Requires no change of Draw Heads or Links and Pins, except that pin being attached to coupler prevents it being lost or stolen.

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AWARDED THE FIRST PREMIUM OF A SILVER MEDAL

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Superior in every point to any modification of the Trip Hammer. Simple, Powerful, Efficient and Cheap. Four sizes now being built. For Prices and Descriptive Circulars, address the manufacturers,

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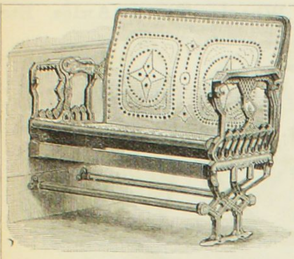

Gardner's New Reversible Car Seat, No 8.

Patented December 6th, 1881.

☞ *Please send for Descriptive Circular giving full particulars and prices.*

As the back reverses, it raises the front of the seat so as to prevent the passenger from slipping off of the seat, and removes the objection made to this kind of seat heretofore.

The large orders already received from the N. Y. C. & H. R. R.R. and other prominent companies for our No. 8 Seat is the best guarantee o its merit.

Made with perforated Veneer, Leather, Plush and Rattan Seats and Backs, which are interchangeable; one kind of seat can be used in the Summer and the other in the Winter.

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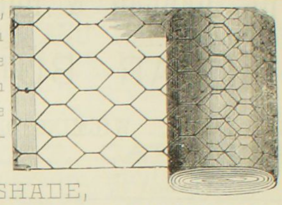
Factory, 330 to 342 E. 61st St.

Wire Netting Railroad, Farm, Sheep, and Lawn FENCE,—Cheap as the barbed fence. If not on sale in your town, write for illustrations and prices to Manufacturers,



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BUSHNELL'S PATENT SPRINGS for Car Seats, Backs, Berths and Mattresses. Best in the *world*. Adopted and used by nearly all of the leading Railroad and Car-Builders in the United States and Canada.

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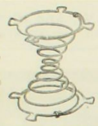
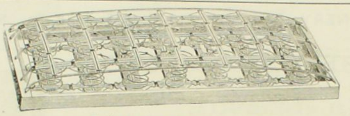
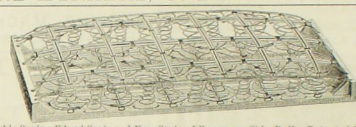




Spring in a Car Seat Frame.



Double Spring Edged Seat, and New Style of Frame, no Side Rails. Patented June, 1882.

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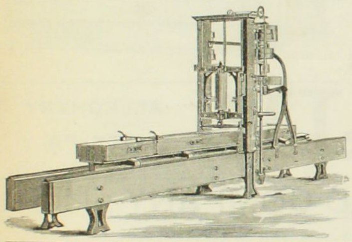

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IMPROVED WOOD WORKING MACHINERY.

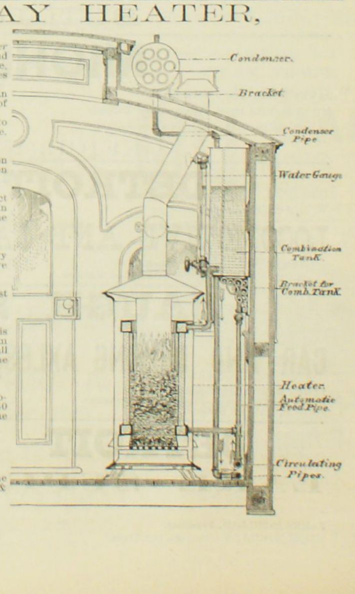
DANIELS PLANING MACHINES A SPECIALTY.

MANUFACTORY: WORCESTER, MASS,

UNITED STATES OF AMERICA.

THE JOHNSON PATENT RAILWAY HEATER,

For Generating Steam, and for Steam and Water Circulation,



Forming two independent currents, hot water for moderate weather, reinforced by steam for severe cold. Heating capacity estimated at 125 *per cent. over any other apparatus in use, with one-third less fuel.* Noiseless and Non-explosive in operation, constructed without Valves or Checks, and requiring no mechanical arrangement for safety,—a device with open pipes. Steam circulation without pressure, affording heat free from smoke, gases, or the objectionable odor arising from over-heated steam. The invention consists in the construction and arrangement of mechanical devices and philosophical combinations through which the results are obtained. The accompanying drawing will place the system in an intelligible form.

The substantial construction and guarded arrangement of the *Johnson Heater* ensures safety from fire or explosion to a far greater degree than by any device heretofore produced. The success of this system of heating is now fully demonstrated by its application upon a large number of passenger cars on the leading railroads in New England.

The official communications which are herewith presented give indisputable evidence of this fact, and are in themselves sufficiently explicit to require no further comment in evidence of the value of this improvement in point of comfort to the passenger and economy for those who adopt its use.

COMMONWEALTH OF MASSACHUSETTS, BOARD OF RAILROAD COMMISSIONERS, No. 7 PEMBERTON SQUARE, BOSTON, June 24, 1882.

CHARLES F. CHOATE, ESQ., *Pres. Old Colony R. R. Co.:*

Dear Sir:—The Board has received yours of the 22d inst., asking approval of the Safeguards for protection against fire furnished by Johnson Railway Heater. The Commissioners have examined the Johnson Heater, and at a meeting of the Board this day it was voted that the "Johnson Railway Heater," for warming passenger cars, be and is hereby approved. Yours respectfully, WM. A. CRAFTS, *Clerk and Sec.*

OLD COLONY RAILROAD CO., BOSTON, June 20, 1882.

ROBERT JOHNSON, *Treas. Johnson Heater Co.:*

Dear Sir:—We have used the Johnson Heater for our passenger cars the past three years. They have given perfect satisfaction in every respect during the extreme cold weather. They kept our cars warm as we desired them to be. I never have heard a word in regard to the heaters, except in commendation of them. We have eighty-two of them in our cars, and shall add more this fall. I consider the new Heater very much superior to the old. It works perfectly. Respectfully yours, A. GLEASON, *Master Car-Builder.*

[GEO. E. B. JACKSON, *Pres.*, PAYSON TUCKER, *Supt.*] MAINE CENTRAL RAILROAD, PORTLAND, ME., June 19, 1882.

ROBERT JOHNSON, *Treas. Johnson Railway Heater Co.:*

Dear Sir:—We have used the Johnson Heater in our passenger cars for the past two years. They have given perfect satisfaction in every respect. During the extreme cold weather of last winter they did all that you claim for them, and our cars during that time were as warm as we desired to have them. Yours truly, PAYSON TUCKER, *Supt.*

ROBERT JOHNSON, *Treas. the Johnson Railway Heater Co.:* OLD COLONY RAILROAD, SUPERINTENDENT'S OFFICE, BOSTON, MASS, June 22, 1882.

Dear Sir:—We have over eighty of your heaters in our passenger cars, and they give entire satisfaction, and during the cold weather of the last winter the cars furnished with them were kept warm and comfortable. Very truly yours, J. R. KENDRICK, *Superintendent.*

OLD COLONY RAILROAD, OFFICE OF PASSENGER TRANSPORTATION MASTER, BOSTON, Jan. 11, 1882.

ROBERT JOHNSON, ESQ., *Treasurer Johnson Heater Co.:*

Dear Sir:—It gives me pleasure to testify to the excellence of the "Johnson Heater," which is in use on this road for the third winter. It is absolutely non-explosive, a great saver of fuel, and more easily managed than an ordinary coal stove. The temperature of the cars is uniform throughout, and gives great satisfaction to the officers and patrons of the road. We are using over fifty of them at the present time, and we shall introduce them in fifteen new cars now building, and are putting them in the older ones as fast as opportunity presents. The larger number of the cars referred to seat seventy-four passengers. Very sincerely yours, J. C. SANBORN, *Passenger Transportation Master.*

EASTERN RAILROAD COMPANY, OFFICE OF MASTER OF TRANSPORTATION, BOSTON, March 23, 1882.

ROBERT JOHNSON, ESQ., *Treasurer Johnson Heater Co.:*

Dear Sir:—It gives me pleasure in testifying to the excellence of the "Johnson Heater," which we now have in use on this road. It is absolutely non-explosive, a great saver of fuel, and more easily managed than an ordinary coal stove. *The Thermometer has shown 60° within 40 minutes after the fire was started.* The temperature of the cars is uniform and gives good satisfaction to the patrons of the road. We have at the present time twenty-six of them, and shall soon add more. Yours truly, D. W. SANBORN, *Mas. Trans.*

THE JOHNSON RAILWAY HEATER COMPANY,

Office, No. 8 Exchange Place, Boston, Mass.

JOHN WOOLDREDGE, President. J. W. PICKERING, Secretary. ROBERT JOHNSON, Treasurer & General Manager.

The Heater can be seen at the Old Colony, Boston & Providence, Fitchburg, Boston & Maine, and Eastern railroads, in Boston; also, at the Maine Central Railroad, in Portland, Maine, and at SMITH & ANTHONY'S, Nos. 52 & 54, Union Street, Boston; Boston & Albany, New York, Lake Erie & Western, Michigan Central, Central Vt., Providence and Worcester, and at Pullman Palace Car Works, Pullman, Ill.

Workshops, No. 30 Union Park Street, Boston, Mass.

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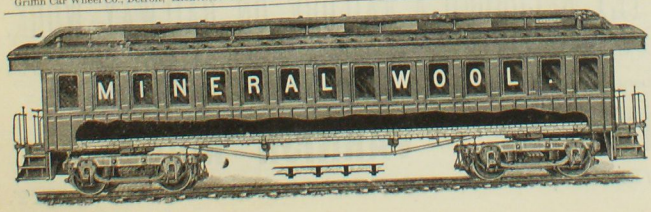

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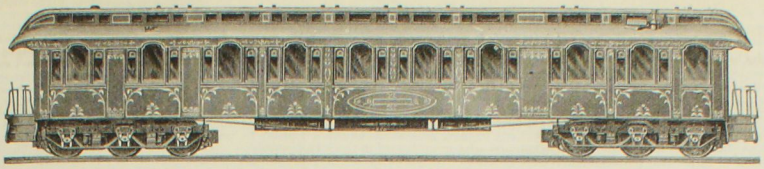


DEVOTED TO THE INTERESTS OF RAILWAY ROLLING STOCK.

VOLUME XIII. NUMBER 8. | AUGUST, 1882. | SINGLE NUMBERS, TEN CENTS. $1.00 PER ANNUM.

PULLMAN dining cars have been introduced on the Midland road, in England.

THE New York Locomotive Works, at Rome, N. Y., are now completed and ready to begin work.

THE new car shops of the New York, Chicago & St. Louis Railway have been located at Stony Island, Ill. The shops will give employment to 1,000 men.

THE Southern States Coal, Iron & Land Company, of South Pittsburg, Tenn., is building 60 gondola cars of 36,000 pounds capacity for the Cincinnati, Selma & Mobile road.

THE United States Rolling Stock Company, whose works are at present in Urbana, O., with a branch in Chicago, are contemplating the establishment of extensive works near Chicago.

THE Wapakoneta automatic car coupling is approved by the superintendents of the Ohio Central and Hocking Valley roads, and is giving good satisfaction in local freight trains on the C., C., C. & I.

THE Indianapolis Car Works have commenced on a contract to build 1,000 cars for the New York, Chicago & St. Louis roads. The cars are 30 feet in length, with carrying capacity of 40,000 pounds.

THE Chicago & Grand Trunk Railway Company will commence at once the erection of car and repair shops at Battle Creek, Mich. Twenty-five acres have been purchased for a site for the shops and yards.

THE elegant new station of the New York, New Haven & Hartford railroad, at Meriden, Conn., is nearly completed, and will rank next to that in New Haven, which is one of the finest railroad buildings in the country.

GEORGE R. MENEELY & Co., manufacturers of the Hopkins' lead-lined journal bearings, at West Troy, N. Y., have established a foundry at Atlanta, Ga., with complete facilities for filling southern orders promptly.

THE new parlor cars of the Philadelphia & Reading road will run on 36-inch Allen paper wheels, the object being to have a larger wheel than the ordinary 33-inch, without incurring the expense of altering the trucks.

THE Fontaine Locomotive Company has been organized in Detroit with a nominal capital of $1,000,000, to build locomotives under the Fontaine patents. The officers are: President and Treasurer, D. M. Ferry; Vice-President, O. W. Shipman; Secretary, Anson Waring.

THE Congdon Brake-Shoe Manufacturing Co. has established a factory of its own on Fifty-ninth street in Chicago. The shop is now employing 25 men, and turning out from 10,000 to 15,000 Congdon brake-shoes per month, the demand for which is found to be rapidly increasing.

THE Allen Paper Car Wheel Company shipped five car loads of wheels to Detroit recently, for the Pullman company's use in construction of palace cars. Each car contained 22 wheels, making 122 in the lot. The company also shipped a car load of 24 wheels to Albuquerque, New Mexico, for the Atlantic & Pacific Railroad.

AN improved railroad cross-tie is made of iron in one piece and is composed of a flat horizontal base-plate cut out in its middle portion and a vertical web extending the entire length of the base and terminating at the ends, with boxes adapted to receive wooden blocks, on which are secured the rails by bolts passing through the box and wooden block.

THE DETROIT CAR SPRING Co., which began its operations three years ago in a frame building of moderate dimensions, has kept on extending, enlarging and improving its facilities until it now occupies a complete brick structure 190 × 240 feet, devoted entirely to the manufacture of railway car springs. Other improvements still are contemplated.

THE BAKER CAR HEATER Co. has been organized at Pittsburg with $500,000 capital stock. The officers are Wm. C. Baker, President; Ralph Bagaley, Treasurer; C. H. Jackson, Secretary. The company has received orders to equip with its improved heater 60 new passenger cars which the Pullman Car Works are now building for the New York, West Shore & Buffalo road.

A NUMBER of new drawing-room cars are in course of construction at the shops of the Philadelphia & Reading road, at Reading, Pa. The bodies are 60 feet in length, exclusive of platforms. Each car has 14 chairs, and a smoking room at each end. The interior finish is in mahogany and other fine woods, and the carving will be of the most elaborate description. The cars will run on six-wheel trucks.

THE American Brake Company, of St. Louis, report 525 cars equipped with the company's automatic freight brake running on the St. Louis & San Francisco Railway, during the month ending June 10, of which 376 were inspected. These had been running from 2 to 15 months, and on 351 of them the brake needed no attention; 25 only needed repairs in consequence of defective iron, the break itself not being at fault.

THE Litchfield (Ill.) Car Co. has just completed 10 caboose cars with a lookout or clear-story containing four seats. The cars have side and end doors and a center brake. On one side are four bunks, double tier, and on the opposite side a seat with hinged top, and forming a receptacle underneath for tools, etc. The company is at work on an order from the Galveston, Harrisburg & San Antonio road for 200 freight cars.

SOME of the English shops which have made a decided specialty of wrought-iron wheels for locomotives, have reduced the process of making them to a very perfect system. They employ for the first forming of the parts of the wheel the usual drop-forging method of working, so that when the welding required in closing up the wheel as a whole is reached, it is found to be the very least possible in amount, and of the plainest kind.

THE question has been seriously agitated by the general passenger agents of roads between Chicago and the East, of discontinuing to some extent the principle of running through sleeping cars to all principal Eastern points. The proposed change was to run sleeping cars, with but few exceptions, in the night only, furnishing a requisite number of parlor cars in the day time. This proposition, after much discussion, was finally tabled, and the present arrangement of through cars continued.

IT is said that iron express cars have been put on the Southern Pacific road. They are described as being very strong and bullet proof, and as containing two compartments, one for treasure and one for expressmen and guards. There are side doors, and also loopholes in the sides for picking off train robbers who may approach from without. Besides the necessary quantity of arms and ammunition and other "modern improvements," each car has four Siberian blood-hounds, costing $250 a piece. One of these cars will go with each train.

A SMOKE-CONSUMING engine, the joint invention of M. Kearney, Master Mechanic of the St. Louis and San Francisco Railway, and Mr. Hawley, is being experimented with, and the results are most satisfactory. The draft, instead of being upward, as in ordinary engines, is downward, thus throwing the cinders and smoke back into the fire-box, to be consumed. In the experiments thus far made there has been a saving of about 50 per cent. of fuel. From trials on locomotives and stationary engines, it is found to work equally well in each case.—*Railway Register.*

A BALL-ROOM car is the latest novelty introduced on the Chicago, Milwaukee & St. Paul road, and recently a merry party of St. Louis belles and beaux made an excursion over the road and danced the racquet with the train moving at forty miles an hour. The ball-room was in a large baggage car, sixty feet long by fifteen feet wide. The floor was elegantly carpeted, the walls beautifully painted, hung with pictures and decorated with bunting, evergreens and garlands of roses. There was an orchestra of eight pieces, and refreshments were passed around every hour.

A LOCOMOTIVE fitted with the Joy valve gear, recently hauled a passenger train on the Philadelphia & Reading road, consisting of 18 loaded passenger cars, the gross weight being about 400 tons, and the maximum grade 60 feet to the mile. The speed is not stated. On the same day it hauled the regular New York express train—number of cars not stated—at an average speed of 60 miles an hour. The performance of the engine is said to have been entirely satisfactory to a number of prominent railroad men who witnessed it. This gear is claimed by the inventor to be an improvement upon the link motion in many respects.

S. W. ROBINSON, C. E., of the Ohio University, in a paper read before the American Society of Mechanical Engineers, says that at the present day many good iron bridges are found to be too weak, and that this is due not to any engineering defect, but to the growth in weight of freight loads and rolling stock. We now find 60-ton locomotives where formerly there were 40, and 20-ton loads per car where there were 10. Hence bridges designed to a strain of 10,000 pounds per square inch of iron section, as due to the former loads, must now stand 15,000 or perhaps more. This is unfortunate, since an iron bridge is so difficult to strengthen in a satisfactory manner, and so difficult to get renewed.

THE Indianapolis *Journal* says that "as soon as the new mill at Chicago is fairly in operation, rails 120 feet in length are to be made and tested on some of the Northwestern lines." The chief wear of rails being at the joints, caused by the pounding of the wheels, great things are expected of this rail. Its advocates favor a weight of 70 or 80 pounds per yard, and predict an extraordinary endurance with slight repairs to ties and fish-plates. Such a rail, however, would be very difficult to handle; and inasmuch as a greater allowance would have to be made at the joints for expansion, each joint being pounded by the same number of wheels as if the rail was of the ordinary length, the result, we fear, would be a disappointment.

THE FAST BOSTON-NEW YORK EXPRESS.—A train of new cars for the fast New York express line has just been completed at the Allston shops of the Boston & Albany Railroad, under the supervision of Mr. F. D. Adams, the Master Car-Builder. The train consists of a baggage car, smoker, two passenger coaches and two parlor cars, and will be drawn by a new engine, also built by the Boston & Albany Co. The exterior of the cars is painted olive, and the marking is in plain but handsome letters. The interior finish of the smoker is mahogany; of the coaches and drawing-rooms, ash and cherry, with bronze trimmings, racks and lamp fixtures. The seats in the smoker are of rattan; in the coaches of dark drab leather, and in the drawing-room cars of rattan with dark drab leather cushions and head-rests. The cars are lighted by full-length windows, which are provided with spring-roller shades. There are eight lamps in each car in handsomely ornamented chandeliers. The floor of the drawing-room cars is covered with Wilton carpeting, and a strip of carpet is laid in the aisles of the passenger coaches. The whole effect of the interior finish and furnishing of the cars is light, airy and pleasing to the eye. There are 33 seats in each drawing-room car and 68 in the others. One of the novelties in arrangement of the drawing-room is that the whole car, except, of course, the saloon, wash-room and stove-room is in one open apartment. Instead of the ordinary compartment there are four seats, similar to those in a sleeper, at one corner of the car. These are for the convenience of a card-party, or a party of friends who may wish to sit close together. They can also be turned into a bed, the bedding being always kept ready, and shut out from the rest of the car by heavy draperies, so that a sick person can be carried comfortably and in seclusion. The weight of each car is about 45,000 lbs. The body being comparatively light, 27,000 pounds, the great weight is near the rail, thus adding to the element of safety. The pair of trucks weigh, in round numbers, 18,000 pounds. The wheels are of paper, 42 in. in diameter, which is 9 in. more than the standard. The journals are 3¼ in. in diameter and 7 in. long. The engine was built under the supervision of Mr. A. B. Underhill, Superintendent of Motive Power. The boiler is made of steel, $\frac{7}{16}$ in. thick, instead of $\frac{5}{8}$ in. iron, which is commonly put into locomotives. There are 221 tubes instead of 160, the usual number. The boiler is tested at 400 pounds of steam, and will be run at 160 pounds' pressure. The train is equipped with the Westinghouse automatic brake. In the construction of the cars and engine the very best materials have been used throughout, and the most improved mechanical devices for securing safety, comfort and speed have been introduced.—*Boston Advertiser.*

RATHER a singular accident occurred near Tarrytown, N. Y., on the Hudson River Railroad, July 8. Two trains, one a sleeping-car train and the other consisting of ordinary coaches, raked out each other's windows as they passed at full speed in opposite directions. Upon investigation it was found that at the point where the accident happened, which was under an arched roadway, the two tracks were nearer together by from 6 to 12 inches than at any other portions of the line, and that the overhang and swaying of the cars, in connection with the iron dust-guards attached to the windows of the sleepers, brought the two trains in contact with the result as stated. It is generally supposed that the distance between tracks on double-track roads is uniform, or rather that the minimum is never less under any circumstances than is absolutely required to prevent trains from contact in passing. But this incident proves that such is not the case on this road at all events. It is a matter that should be looked after and remedied at once, or passengers will be afraid to take seats or berths on the left side of the cars, although it may be the shady side and command a view of the river.

A MINIATURE model of a freight car is on exhibition in a shop window in Springfield, Mass., and represents the cars built by the Wason Co. for the Quebec, Ottawa & New England Air Line. The model is one-eighth the size of the originals, being 50½ inches long, 18¾ high and 13 wide. It lacks nothing belonging to a car, although separate patterns had to be made for all the details of the iron work. It is made with such accuracy on a scale of 1½ inches to the foot that all the sheathing and the blocks of tin on the roof conform in size to one-eighth of what is called for on the regular cars. It took one man three months to make the model, and he had help from others, and it cost between $300 and $400.

A NEW method of train telegraphing invented by Capt. C. W. Williams, U. S. A., was recently tried on the Atlanta & Charlotte Air Line. The method is too complicated to be made clear by a description, but the result aimed at is to enable train dispatchers to be in constant communication with every train on the road, and each train with every other train and with outside telegraph offices. So far as could be judged from the trial, which was confined to only 200 yards of track, the practicability of the invention was fully established.

Some New Chair Cars.

The Chicago, Burlington & Quincy road has been bui ing three chair cars, two of which are just completed. They are 58 ft. long and 10 ft. 4 in. wide over the sills. The total wheel base is 54 ft., and the distance between centers of body bolsters 44 ft. These bolsters are of wrought iron, and have some peculiar features. They are made of two plates of 1 by 7 in. iron with 6 inches space between them at the centers. The straight top plate has a lip turned over on the bottom side forming a shoulder, against which the bottom plate bears, similar to that in the wrought iron body bolster of the freight car of the road, illustrated in the CAR-BUILDER of September, 1881. In the center of this bolster, between the plates, is a cast iron column, with a hole in the center for the king-bolt; the side-bearings are bolted on in the proper places. The bolsters are firmly bolted to each sill.

At each end of the car is a bulkhead. One is about 8 ft. long in the clear, and has a ladies' saloon 4 ft. 6 in. × 3 ft. 2 in., and a heater room 3 ft. 4 in. × 3 ft. 2 in. on one side, a ladies toilet 5 ft. × 3 ft. 2 in., and a storage room 3 ft. × 3 ft. 2 in. on the other side. These rooms have doors leading into the passageway, which is 3 ft. 2 in. wide in the clear. The other bulkhead is fitted on one side with a linen closet 2 ft. × 3 ft. 2 in., and a gentlemen's toilet 5 ft. long opening into the passage and having two washbowls; on the other side is a storage room 2 ft. 6 in. × 3 ft. 2 in., and a gentlemen's saloon 4 ft. 6 in. × 3 ft. 2 in.

The central saloon or sitting room of the car is 42 ft. long in the clear, and contains 40 reclining chairs placed in four rows, two on each side of the aisle, in the center. The outside row, next to the windows, is about 1 ft. 2 in. from the posts, and the two rows are about 2 ft. between centers, leaving an aisle about 1 ft. 4 in. in the clear. Lengthwise of the car the chairs are 4 ft. between centers. The window openings are 2 ft. 10 in. between posts, and look large, giving a good range of view. They have double sashes and handsome cloth curtains. The clear-story windows have swinging sashes.

The wood-work is of mahogany and ash, neatly carved with tasteful designs. The head-linings are of wood veneers, ornamented in slightly dark colors. The ornaments or trimmings and lamp frames are of burnished oroide. As one looks down the car it seems rather cozy and homelike, the rich chairs and carpets being relieved by the lighter tone of the wood-work. The outside is finished with the V-grooved siding adopted by the company, and is painted canary yellow. The cars have Pullman roof-ends, with end ventilators, also Miller platforms and couplers and Westinghouse automatic brakes.

The trucks are of the C., B. & Q. standard pattern, with 33-inch iron wheels and 10-foot wheel base. The car-body has no truss-rods, but is supported by Challender truss-plates between the side sills and the windows inside. The cars are in every respect very handsome and attractive, and will be appreciated by the traveling public.

Master Car-Builders' Association.

SIXTEENTH ANNUAL CONVENTION.

(In Continuation.)

The following question was proposed for discussion:

Is it safe to run a journal under passenger cars after it has been heated so as to burn out the packing and then cooled off with water—supposing the axle to be made of first class iron?

MR. C. E. GAREY: We seldom have boxes as hot as that, and when we do we invariably take out the wheels.

MR. FORD: I suppose a great many wheels are run under passenger cars after being treated in that way, and I would ask if any member present has known a journal to break in running after being heated in the way described.

MR. BISSELL: The journals under new cars will get warm if ever they will. It is seldom the case that such journals are taken out.

MR. L. GAREY: Car-builders, as a rule, pack their boxes very shabbily, and they almost always get hot; but they very seldom are allowed to get hot enough to burn the packing out and be cooled off with water. I have taken great interest in trying to learn what was the cause of journals breaking off at the shoulder and showing no fracture, while the center of the axle would show remarkably good quality of iron. A few days since I was testing some axles, and during the test I put under a few old axles, and at the second blow on one of them the journal flew off into the air. I should say 10 or 15 feet, simply with the jar of the falling weight. The axle was tested with a 1,600 lbs. drop, and to ascertain the quality of the iron, the axle was broken by seven drops, reversing it each time. The journal showed no fracture, but the iron was completely crystallized, and this in my opinion was caused by heating and cooling off with water, while under load. I am so well satisfied of this that I give instructions to remove all axles when the journal become so heated as to require being cooled with water. I have known instances in which the journal dropped off and was found in the box, the car coming in safely. A microscopic examination of journals that dropped off in this way showed very often a yoke the whole distance round the axle at the shoulder, and this showed that the journal bent as it revolved.

BEST DIAMETER FOR CAR WHEELS.

The Committee on this subject being called on for a report,

MR. MILLER said that no report had been prepared by the Committee in consequence of a lack of co-operation on the part of its members. He referred to the report made last year, and said there was not much use in talking about what a 33-inch chilled wheel would do; and as for steel-tired wheels, they had not been in use long enough to test their ultimate capacity. He feared he was a little prejudiced in favor of 42-inch wheels for passenger service, and that the Committee had nothing to say in addition to what was contained in last year's report. He moved that a new Committee be appointed, which was agreed to.

STANDARD BUFFER BLOCKS.

MR. FORNEY called attention to the standard dimensions of single and double blocks adopted by the convention, and said that in making a drawing of the blocks as adopted, the single block would overlap the double ones only an inch on each side. He thought the distance between the latter should be shortened to 12 inches, so as to make the length over all the same. He also called attention to the fact that the double blocks were 6 inches thick, and the single block 7 inches.

MR. KIRBY said that a 4-inch backing price was generally put behind the double blocks, which would make them project 10 inches in all.

MR. LENTZ spoke of the great number of small coal cars running on the Lehigh Valley and other coal roads. Unless the regular freight cars have a large dead block they will overlap the blocks on the small cars. The blocks on the coal cars should be about 13 inches long, otherwise the freight cars could not be run with them without causing great damage. He would suggest that the committee on the subject be increased to five members, and that two of them should be men who have experience with cars running in the anthracite coal region.

MR. RAYMOND moved that the distance between the double blocks be 12 inches instead of 14 inches.

MR. LENTZ moved to amend further by making the face of the blocks 8x13 inches, instead of 8x8. He thought there were not less than 60,000 small cars in the anthracite coal trade, and that this fact was worthy of consideration in determining the standards for buffer blocks.

MR. FORD said that the cars referred to were a peculiar class that were used mostly by themselves, and constituted but a small percentage of the total number of freight cars in the country. The standards for buffers were intended for 8-wheel cars—box, flat, gondolas, and stock cars. A block 13 inches long would make it dangerous for the men in coupling.

MR. L. GAREY considered small coal cars as special cars, that ought to be run only on home roads and in trains by themselves, so there would be no necessity for interchanging with 8-wheel cars.

The motion to reduce the space between the double blocks to 12 inches was then agreed to.

AMENDMENT TO THE CONSTITUTION.

The report of the Committee was read by Mr. Forney, recommending the adoption of the amendment as heretofore published in the CAR-BUILDER.

MR. DAVENPORT moved to add the words "Provided, that no representative member shall represent more than one railway company," which was agreed to.

MR. BISSELL was in favor of the adoption of the amendment. It had been approved by the general officers of a large number of roads, and it would be discourteous to get up any opposition to it in the convention.

MR. FORNEY wanted members to speak out, "here and now," if they did not agree with the views of the committee.

MR. BISSELL referred to the views of Mr. Geo. H. Watrous, President of the New York, New Haven & Hartford Railroad Co., as expressed in his letter in response to the circular of the committee, and thought they were very pertinent as an argument against the adoption of the proposed amendment. He (Mr. Bissell) agreed with Mr. Watrous; but as the advocates of those views were in a minority, he would gracefully submit to the inevitable.

MR. ADAMS said that the views of Mr. Watrous were no more than might have been expected from a company which took no interest in the association, and whose road had never been represented in it more than once or twice, perhaps. He did not think Mr. Watrous knew or cared very much for it, nor was it likely that his road would pay much attention to any rules or suggestions the association might make, unless it was absolutely compelled to.

MR. L. GAREY said that under the operation of the amendment, the active or working members would be in certain respects the privileged class. They would act independently of any road influence, and according to their best judgment derived from experience; while the representative members would be saddled with a load of responsibility resulting from their representative character.

MR. C. E. GAREY said that as he understood the operation of the proposed amendment, the action of the association would be in the future as it had been in the past, simply advisatory, and that any standard that might be recommended would not be binding upon the roads. The object of the amendment was to give to the association a more influential status than it has had before.

MR. FORNEY said that any attempt to make the action of the association binding on the roads would be futile. It was not proposed to change the character of the work of the association, but merely to have the roads more directly represented, and that such representatives should come together and try to agree upon certain things, and to recommend that what is agreed upon be adopted by the roads. He thought that in nine cases out of ten car-builders would be sent as representatives. The amendment required a "practical knowledge of car construction," as a necessary qualification; but just what interpretation would be put on this language would have to be determined in future.

MR. FRY: It would be well to bear in mind that the effect of this amendment will be to give the decisions of the association greater weight. Undoubtedly there is a feeling among railroad officials when we carry home the news that a certain rule has been adopted, or a certain standard advised, that it may have been carried without due consideration. For instance, if we were to go home and say that a standard dead-wood had been adopted, it would be hard for any of us to say how many members really thought that was the best that could be recommended, and it would be hard to say what proportion of the roads of the country would have to alter their standards to conform to it, and how many of the roads were willing to alter. It is well known to everybody who attends these meetings that very few of the members care to take much part in the discussions, and a great many of them do not even care to vote; and when a question is put, a few say aye, and those who do not like to oppose it very often do not say no. It is difficult to get a full expression of opinion, but if each member knows that his vote is to be counted, that he represents a certain definite amount of capital, and that there is a certain amount of responsibility attached to his vote, he would be very careful to understand what he is voting for, so that when he gets home he would be able to explain the reason that induced him to vote in that way, and also to give the matter due consideration; and it will give those who hear of what has been done the feeling that the matter has had a very careful consideration. Men will not vote and have their names recorded as carelessly as they would if no one knew upon which side they voted. I have spoken to a great many of the gentlemen here present, and it seems to me they all have felt that there was a necessity for bringing their views before the railroads more clearly than they have been presented heretofore. This measure, more than any other, will assure the railroads that we are here for legitimate business.

MR. ADAMS: I did not intend to say much about this matter, but evidently there are some present who are opposed to the amendment, mainly because they are afraid that in some way the association will lose its identity, and be controlled by others who know less about cars and their construction than the present members do. But the proposed change impresses my mind in a different way entirely. Our organization is, and always has been, a voluntary one. It has paid its own way. The object of the change is to enlist the management of the roads in the well-being of the association. I never knew any body to feel much interest in any thing that did not involve some cost. If road managers shall contribute fifty, or one, two or three hundred dollars a year, as they may do, towards defraying the expenses of this association, they will feel interested in its doings. They will probably send competent car-builders to represent them, and who would act with a greater sense of responsibility and be more careful how they voted.

MR. C. E. GAREY: I understand from what has been said that the votes of representative members are to be recorded. This will make them vote more intelligently than some of us now do. But will not the votes of the so-called active members be recorded also?

MR. FORNEY: There is no doubt about that.

The amendment was then unanimously adopted.

MR. FORNEY called attention to the fact that there were many things in the constitution that needed revising in order to make them harmonize with the amendment that had just been adopted. Some new provisions and additional safeguards were also needed, and these should be carefully considered. To afford time for doing this, and avoid improper haste, the following resolution was offered by Mr. Fry:

Resolved: That the Committee on Reorganization be instructed to notify the Presidents, Managers and General Superintendents of the railways of this country, Canada and Mexico, of the adoption of the amendment to Article III. of the Constitution, and invite them to send Representative Members to an adjourned meeting of this Association to be held on the second Tuesday of October next, at Niagara Falls; and that the same committee be instructed to report at that meeting such other amendments to the Constitution of the Association as on investigation they may think are desirable.

MR. DAVENPORT thought the resolution was a proper one to be adopted. While it was important that prompt action should be taken, it was equally important that such action should be deliberate and well considered. This could not be done at the present meeting. The general managers of the roads would probably have some suggestions to make, and it was due to them, in view of the ready response they had made to circular of the committee, that they should have time to be heard.

The resolution was then adopted.

STANDARD BRAKE-SHOE.

The report of the Committee on Brake-Shoes was then taken up. [This report was printed in our last issue, and recommends the adoption of the *Christie* brake-head and shoe as a standard, and also that brakes be applied to 8 wheels instead of 4.]

MR. ADAMS, in answer to inquiries as to what kind of a shoe the Christie shoe was, said it ought to be pretty well known, as the committee reported on it last year, and said

it was then in use on some 60 roads. It was a very common shoe, and this, with the fact that it was so extensively used, and that the patent on it would soon run out, was the reason for recommending it.

MR. C. E. GAREY suggested that in view of the change in the organization of the association that had been determined upon, the adoption of a standard brake-shoe be deferred until the next meeting.

MR. RAYMOND had no objection to this, but thought the merits of the shoe could very properly be discussed now.

MR. DAVENPORT said that any decided action now in favor of the shoe would be an inducement to the inventor to get his patent renewed. He was, therefore, in favor of the motion to postpone; and the motion was carried.

STANDARD WHEEL GAUGE.

The report of the Committee on this subject was then taken up. [For report, see July CAR-BUILDER.]

MR. DAVENPORT moved that the report be adopted.

THE PRESIDENT said the committee did not agree. There was a majority and a minority report, and it would be difficult to adopt both. As the matter had not received any special attention, and as the hour for recess had arrived, it would be advisable to defer the discussion for the present.

MR. BISSELL said that when the subject was discussed he wanted members to determine what was the best method of testing the exact distance between the centers of journals. It was difficult to find out from the drawings exhibited whether the wheels are pressed on when they are on the axle. He had a gauge that tested the whole thing at one application, and showing whether the face of the wheel is the exact distance from the journal. It also showed whether the wheels were strong, whether they were bored true and whether they are, when pressed on, further apart on one side than on the other.

REPAIRS OF INTERCHANGED FREIGHT CARS.

The annual meeting of the representatives of railroads for the revision of the Rules relating to the Repairs of Interchanged Freight Cars was held on the second day of the sessions of the convention, 42 roads being represented. The Rules as revised last year were formally adopted by 49 roads, owning 329,000 cars, and informally adopted by 26 roads, owning 53,491 cars. The only material change made was to increase the price of the ordinary gondola car from $450, as provided by Rule 17, to $475.

An ineffectual effort was made to amend Rule 6, so as to provide that when a car is received by card, the road receiving it may make the repairs called for by the card and charge the same to the road putting on the card. A proposition to amend Rule 16, so as to increase the price of brass journal bearings and iron castings, was also rejected.

The Rules now in force are therefore the same as those of last year, except the change in the price of gondola cars, as above.

STANDARD WHEEL GAUGE.

THE PRESIDENT called attention to the report of the committee on this subject, and the necessity of a standard gauge for wheels, or of templets that can be used as standards. The usual practice was for each shop, even on the same road, to gauge their wheels as they saw fit; or, in other words, to gauge them nominally such a distance apart and guess at any allowance that was considered necessary to have them work freely on the rails. He hoped members had examined the drawings accompanying the committee's report, and had made up their minds whether they embodied any improvements on the existing practice.

MR. C. E. GAREY, referring to the drawings, said that a very full set of templets was shown for measuring wheels by caliper and circumference, also for gauging axles and tracks, and to set the wheels at a proper distance on each end of the axle, and also a gauge working from the center of axle. This last-named gauge was very important, as it kept the wheels in exactly the same position, and if the axle happened to be an eighth or a quarter of an inch too long, the button could be made a little thicker on the end. He thought he saw some improvement in the gauge for gauging wheels both inside and outside, as compared with the one he was using. He thought wheels should be gauged from the inside of the flange; then, if there is a trifling difference in the thickness of the flange it would not knock the brakes and guard-rails. The axle-gauge was designed to prove the other gauge working from the center. It gave each axle and each journal the same length, and tested whether the other gauge had been properly applied. There was also a gauge for testing whether the bore of the wheel was round. It was frequently found that the bore would not fit the axle, and this gauge would prove it.

MR. DAVENPORT said that the accuracy of gauges involved at the outset uniformity in the form of the wheel. The wheels of one maker differed from those of another in the thickness of flange, the shape of the core and in the tread. There was difficulty all round. The wheel makers were ready to make any form and shape of wheel that was wanted, and were waiting for the association to say what it did want. Until this was settled, the wheel-makers must go on blindly and make a great variety of wheels, many of which were not wanted. A prominent master car-builder, who had looked into the matter very thoroughly, was in favor of wheels with straight instead of coned treads, and had satisfied himself from demonstration that such wheels would run more evenly and curve just as well. As for the popular idea that coned wheels got around curves more easily, a good deal he said depended on whether they were pulled or pushed around the curve. If pushed around, the tendency of the wheels was to go off on a tangent and hug the outer rail, in which case the coning would be a help; but if the car is pulled around, it is forced toward the inner rail while the momentum of the train carries it toward the outer one. But in the case of the freight trains, the draft of the train tends to force the wheel against the inner rail. It was for the convention to decide what kind of wheels were wanted, and he hoped the decision would be made without further delay.

MR. GRIFFITH asked if the wheels were forced against the inner rail, as stated, why it was that the outer rails in curves were invariably cut and worn away so as to require being replaced much oftener than the inner ones.

MR. HILDRUP strongly favored the conical tread. It was true that in curving the wheels inclined to the inner rail, but in a very small ratio. Any one who watched a train going round a curve either slow or fast would find that the flanges of the wheels were against the outer rail. He, as a wheel maker, would not make straight tread wheels unless by a positive order from somebody who would take the whole responsibility.

MR. BISSELL suggested that the reason why the outer rail in curves wore out faster than the inner one was because the truck, working freely on its center, tended to fly off on a tangent, and consequently the outer rail received the greatest pressure from the wheel flanges.

MR DAVENPORT believed in the coning of wheels. He had only quoted the views of another man in favor of straight treads, and that man was quite able to defend his own opinions. He will say, of course, about the outer rail being worn most, that the engine truck does it and not the car trucks. And then he will ask, "How long does your cone last?" This, it must be admitted, was an ugly question, because we all knew that whatever amount of coning a wheel has, it is all gone in a little while, any how.

MR. C. E. GAREY said he had watched freight car trucks running on curves, and invariably found that the leading wheel, when it was moving slow enough to be watched, crowded the outside rail; but with the rear wheel of the same truck it was exactly the other way—that is, trying to get crosswise the track.

MR. ADAMS: I have seen cars that wouldn't curve at all, but run straight over the track. A good deal depends on the adjustment of car body and trucks. If the trucks have center-bearings so they will curve naturally, they will get around curves easily. I think there can be no doubt that the cutting of the outside rail is largely the work of the engine. Everybody can understand that the inclination of a body moving at a rapid rate, and particularly a heavy body, will be to keep a straight line until it meets with sufficient resistance to change its course. The forward wheels of the truck are crowding the rail, but that tendency is counteracted by the tendency of the engine to pull the train in a straight line. I know there is great difference of opinion upon this subject among scientific men. Mr. Dudley, who has given much attention to the matter, is inclined to believe in flat treads, and he has had the wheels under his car turned flat. He has to buy coned wheels (I don't know that anybody makes flat tread wheels), and have them turned flat for his use. Those wheels of his have made a large mileage. I am not sure that a flat tread wheel will work; but I was surprised, on examining his wheels, to find that they touched the flanges so little.

MR. VERBRYCK: Perhaps Mr. Dudley's road is entirely straight.

MR. ADAMS: Mr. Dudley's car runs on every road in the country. It runs on our road a good deal, and we have about as crooked a road as there is. They say it wears out all the brakes in the country and all the wheels of every road but our own. I do not think we are prepared at present—I, at least, am not—to vote for the flat wheel entirely. Mr. Davenport says the wheel makers are waiting for us. I would like to ask him how many wheel makers he speaks for. I have found that they are rather an independent set, and think they know as much about wheels as anybody.

MR. HILDRUP: They have to warrant their wheels.

MR. ADAMS: Yes, and if they are not good wheels we send them back. It would certainly be a good thing if the wheel makers would have a convention and decide upon a standard wheel. In such case the roads would, perhaps, conform to the standard. But if we fix a standard, the question will be whether the wheel makers will agree to alter their pattern and come to our standard.

MR. DAVENPORT: When you order wheels you specify the kind you want; and if it is the master car-builders' wheel I would like to see a wheel maker send you anything else. If he did, you would send the wheels right back. You have it all in your own hands, gentlemen. We are going to do just as little on patterns and carry just as light a stock of wheels as we can, until the master car-builders' decide what they want. It will be the same as it was with the axle men. They would not agree on an axle until you had agreed on one. You ask any axle manufacturer if he has a stock of master car-builders' axles, and you will find that he has.

MR. HILDRUP: I think the statement that wheel makers are ready to make any kind of wheel that is called for by this association should be qualified a little. Every wheel maker has his own peculiar notions. I never knew one of them who didn't make the "best" wheel. The size, width of tread, form of flange, depth and size of hub, etc.—whatever relates to shape—there is no trouble about, the makers conforming to whatever is demanded. But when it comes to the weight of wheels, and certain little curves and proportions, the wheel maker must keep these things in his own hands. If he warrants his wheels, and gives the sizes and forms asked for, the other points should be left to himself.

MR. FORNEY said he had spent much time in the investigation of this subject and had found it to be a very complicated one. The precise relation of the flange to the rail in curving was extremely difficult to understand, and perhaps it never will be thoroughly understood. He thought, therefore, that caution should be exercised about what was recommended, and before wheel makers were induced to change the form of their chills and flanges.

MR. L. GAREY: I am in favor of non-coned wheels. Let us analyze the matter a little. In the first place, as to the advantage claimed for coned wheels in going round curves. I would ask if the elevation of the outer rail does not take up all the cone on the wheel; or, in other words, make a flat tread so far as the rail is concerned? This being the case, and the rear wheel of the same truck being coned, the coned wheel is obviously no advantage in curving. If the cone is good for any thing on a curve it is bad on a straight track, because it obstructs the tendency of the wheel to reach the point towards which it is moving, causing it to run first on one side of the tread and then on the other. This caused the car body to oscillate correspondingly, which was disagreeable to passengers and of no advantage to a freight car. To prove that this is so, I will cite an instance in which an attempt was made to run a coned wheel transfer table by power, and it was utterly impossible to run the table back and forth over the rails unless there was a car upon it. The substitution of flat tread wheels put an end to the trouble. In my opinion, if the outer point of a flat tread was beveled, the wheel would get the advantage of the cone, if it has any advantage. In regard to the rails, it will be noticed that on curves the inside of the rail is worn down so that when the coned wheel runs on it it is equivalent to a flat tread and nothing more. The coned treads also will frequently be found so much worn as to present two flanges, one on the inside and one on the outside. Mr. G. spoke of the variations in the diameters of 33-inch wheels and in the width of treads, all of which could be remedied by having uniform chill molds. He also spoke of the necessity of a definite gauge for men to be governed by in seating wheels on axles for standard gauge track, and hoped these things would not be lost sight of in the discussion.

MR. LENTZ, of the Lehigh Valley road, said he had been testing flat tread wheels for the past year, and they had thus far given good satisfaction, showing no greater wear on the flanges than did the coned wheels.

MR. L. GAREY referred to a certain engine on the Hudson River road that ran so badly that the engineer couldn't ride on it. It was taken into the shop and the cone turned off the wheels, after which the same engineer, not knowing what had been done to it, made a trip with it to Albany, and said it was the best riding engine on the line. This was, in Mr. G.'s opinion, only another evidence that wheel coning was an old fogy notion that ought to be abandoned.

ANOTHER MEMBER said that he had been turning tires of locomotives on his road for ten years past, and all of them had been turned flat. He had, however, coned and chamfered the edges nearly two inches, and it was a decided improvement.

The following resolution, previously offered by Mr. Forney, was then agreed to:

Resolved, That the Committee be instructed to get the opinions of the car-builders and wheel-makers of the proposed form of wheel tread, and report at the meeting in October, and that the wheel-makers be then invited to take part in the discussion of the subject, and, in the meantime, that members be requested to make some experiments relating to the best form of wheel tread.

It was then agreed that the standard diameter of chill molds for 33-inch wheels be 33½ inches at the point on the tread indicated in the drawings; and that such standard diameter of molds for 30-inch wheels be 30¾ inches at the point indicated.

A long discussion followed in reference to the amount of lateral play that should be allowed between the wheel flange and rail, developing much difference of opinion as to the point at which the wheels of cars should be adjusted so as to run on 4-8½ and 4-9 track and be accepted on both. The report of the committee was finally adopted, with the exception of the limited or distance gauge between the inside of flanges, as represented in drawings; this part of the report being deferred until the October meeting, for the reason that the gauge made no allowance for swelled flanges or other imperfection in castings.

STANDARD SCREW-THREADS.

The report of the committee on this subject, as printed in our last issue, having been presented, Mr. Davenport moved that the committee, in conference with the Master Mechanics' Association, be requested to negotiate for a set of standard soft or unhardened gauges for the joint use of the two Associations.

Mr. C. E. GAREY moved to amend the motion by instructing the committee to procure a set of gauges for the use of the Master Car-Builders' Association.

Mr. FORNEY suggested that if each association had a set there would be two standards, and an unnecessary expense in procuring them. The object was to have a standard deposited in the archives for reference when there was any doubt as to the correctness of taps and dies, whether furnished by the Pratt & Whitney Co. or any one else.

Mr. HILDRUP thought it would be better to have an accurate gauge in all the shops. According to the committee's report, there was but one concern that could furnish correct duplicates, and these were wanted in the shops.

Mr. FORNEY: Suppose you should buy some taps and dies of some rival manufacture with the assurance that they were perfectly correct. How could you determine whether they were correct according to the standard of the association, unless you have a definite and specific standard to go by?

Mr. BISSELL wanted to know if the two-foot rule was included, and if not, he would move that it be included.

Mr. HILDRUP insisted that his point remained good. It was a good distance from Harrisburg to New York if he was to take every tap from the latter place.

After some further conversation, it was agreed that the committee be instructed to get a set of soft gauges from the Pratt & Whitney Company, including also a two-foot rule.

SUBJECTS FOR NEXT MEETING.

Mr. DAVENPORT moved that the committee on subjects to be considered at the next annual meeting be permitted to report at the October meeting.

Mr. RAYMOND: I would like to move as a substitute for that motion, that the committee on amendments to the constitution be instructed to call up at the October meeting reports of Committees and recommendations as to standards already adopted by this association. I contemplate moving at the proper time that the secretary cause to be printed and sent to each of the members, active, associate and representative, a statement as to each of the standards which the association has heretofore adopted. It seems to me perfectly plain that at the October meeting, it is impossible for any new committees, or even any old committees, to report upon any original investigations made between now and that time. It also seems to me that the standards, or at least some of them, which have been adopted heretofore, will come up at that time and be discussed. To meet in October simply to make an amendment to the constitution, would, of course, be silly, and it seems to me that some of the standards already adopted should come up then for ratification.

Mr. ADAMS thought the motion was unnecessary, for the reason that the October meeting would be as competent to deal with all subjects as the present annual meeting.

THE PRESIDENT ruled to that effect.

Mr. RAYMOND: Mr. Forney, myself and others here, who have been interested in this matter, have for three or four years been anxious to bring about such a state of things as should, to use a homely expression, put this association into the lap of the railroad companies, and get them to be responsible for what we do and to pay our expenses. Now we will gain a great advantage, more than by any other means, by saying to the railroad managers, we meet in October to carry out these amendments to the Constitution which we have adopted, and to discuss certain questions and adopt certain standards, and we say to them indirectly, what we do there is your action. That is what I am driving at. The President is right in saying that any question that can come up at an annual meeting can come up at the October meeting. If that is so, our true policy is to say now what we will do in October, in order to keep the managers at the back of the association, make them pay the expenses, and make them do what it is determined to do here. We can only accomplish that by saying to

them what will be the questions coming up in October. The railroad companies are the source of power and the source of money, and it is the salvation of this association to put it into the laps of the railroad companies. I will therefore add to my motion that no other subject matter shall be brought up at the October meeting, except as may be ordered by a resolution at this meeting.

The motion was not seconded.

The committee on the subject of holding joint meetings the Master Car-Builders' and Master Mechanics' Associations made a report recommending the adoption of the following resolution:

Resolved, That a committee be appointed by the Chair to meet a similar committee from the Master Mechanics' Association, and that such joint committee shall have full power to arrange upon the time and place for holding the next annual meetings, and the Secretary be requested to notify the Master Mechanics' Association of our action in the matter.

The further consideration of the subject was postponed until October.

The election of officers and designating the place for holding the next annual meeting were also postponed until October.

Mr. DAVENPORT exhibited some specimens of Norway and Southern pine which had been tested by a United States standard steelyard suspended in a frame. There were five pieces of each kind, each piece being one inch square and 11½ inches between breaking points. The pressure was applied in the centre. The Southern pine broke at an average pressure of 506 lbs., and the Norway pine at an average pressure of 655 lbs.

Mr. MILEHAM, of the committee to nominate officers for the ensuing year, said that he had been requested by Mr. C. A. Smith to say that he (Mr. Smith) was very desirous of being relieved of his duties as Secretary of the Association, and that some other person should be appointed in his place.

Thanks were voted to the Pratt & Whitney Company for their labors in producing a system of gauges, and the convention then adjourned to meet at Niagara Falls on the 10th of October next.

Master Mechanics' Association.

LOCOMOTIVE BOILERS.

At the recent annual meeting of this association, Mr. Reuben Wells, of the Louisville and Nashville road, made an elaborate report on the construction of locomotive boilers. We can only make room for the following abstract:

As regards the material to be used in the construction of boilers, homogeneous steel, as now made in this country, leaves but little to be desired; but, notwithstanding its excellence, it is not entirely free from ruptured side sheets in the large class of locomotive boilers, where the box is deep and the water used deposits a hard scale. The fault, in most cases, is not so much with the material as with strain from compression beyond the elastic limit. That fire-box sheets are frequently subject to such undue strains, was shown by a series of tests published in the tenth annual report of the association. The formation of the steel is such as to increase expansion by allowing it to attain a temperature higher than it otherwise would, developing strains in the sheet that sometimes produce permanent elongation or contraction in a comparatively small section of the sheet, and when the temperature becomes uniform in all parts of the sheet, the part under tensile strength is liable to rupture, beginning always at a stay-bolt hole.

On some of the divisions of the road with which the writer is connected, not 5 per cent. of the fire-box sheets in engines doing heavy work have cracked during the past 10 years. The water used deposits very little scale. On other divisions, more particularly those north of the Ohio River, the facts are somewhat different. When the water is more or less impregnated with lime and other impurities, the life of fire-boxes is probably not more than one-half the average of those used on lines south of the Ohio River.

The character of water used has, of course, an important influence on the life of a fire-box and tube ends, but even with the best of water a fire-box has its day. With good water the flanges of the tube-sheets, and the back sheets from the top of the grate about 36 inches up, are the points which ordinarily give out. With water which makes a heavy scale the side sheets give out at the stay-bolts. It is important in all cases that the flanges of fire-box sheets should be as short as possible. The closer the seam is to the corner the longer it will last. This is a matter which, I conclude from observation, is very often overlooked in fire-box construction. All laps exposed to the fire should be as short as possible, especially where the heat is great. If properly turned, the flanges need not be more than 2 inches from the face of the sheet in the vertical seams for a distance of 2 or 3 feet above the grate. A lap of 1¼ inches for the seam is sufficient at that place. Further from the grate the lap and length of flange may be increased without danger. I have noticed many cases where tube sheets were much worn around the end of the tube in the form of counter-sink about ¼ inch wide, and the same in depth around the lower and central tubes, while at other points the sheets were apparently good. Such wear is almost always found in engines which are doing work with boilers too small for their cylinders. With copper tube sheets the wear from this cause seems to be even greater than with steel sheets. This cutting away is due, probably, to the impact of particles of coal and cinder drawn toward the tubes by the force of the draft. The action of these particles is the same as that of sand in the sand blast. If this theory is correct, it is well to have as little projection of the tube ends as possible. To countersink the tube hole sufficiently to receive the flange on the end of the tube without leaving a sloping projection on its outer edge will add to the life of the sheet.

As regards improvement in the design of boilers, little that is new can be said. The first successful locomotive boilers were of the tubular pattern, the fire-box surrounded by a water-space. The same form is used to-day, and, until some new method of generating power is discovered, we may be obliged to continue using it. The "Verderber" boiler, without water-space around the fire-box, was tried on several locomotives on one of the Hungarian roads, but it seems to have been a failure.

In designing a locomotive boiler the character of the fuel should be carefully considered, especially in proportioning the grate area of the fire-box. I will give the results of a series of tests made in the boiler of one of the passenger engines of the Louisville & Nashville Railroad, in April and May, 1882, with seven different kinds of coal. The engine had 18×24-inch cylinders, 5 feet 3-inch drivers, 8 wheels, a boiler 54 inches in diameter, the wagon top raised 6 inches above the cylinder part and a 30-inch dome. The fire-box was 72×34 inches at the grate. There were 191 2-inch tubes 11 feet 5¼ inches long. The fire-box with brick arch, supported on four water pipes tapped into the sheets below the boiler tubes and into the crown sheet 13 inches from the back sheet. The live grate area was 12¼ feet; tube surface (inside), 1,052 feet; heating surface of fire-box, 115 feet; total, 1,167 feet; deducting for tube holes, fire-door and surface below grate. During the tests the engine was run and fired by the same men, the coal carefully weighed and the water measured. The average speed run was 27 miles per hour, and the average number of cars per train 6$\frac{1}{15}$. Wood was used for firing up.

Coal.	Eng. miles.	Evap. of water per lb. of coal.
No. 1	374	7.311
No. 2	561	5.837
No. 3	374	6.402
No. 4	374	6.269
No. 5	374	5.393
No. 6	748	5.482
No. 7	561	6.327

Average temperage of water in boiler 65° F.; average steam pressure in boiler, 130 pounds. The total engine mileage was 3,366 miles and the average evaporation 6.002 pounds water per pound of coal. Each run was 187 miles. The coals used were:

No. 1—Best quality, Pittsburg.
No. 2—Inferior quality, Pittsburg.
No. 3—Alabama.
No. 4—Tennessee, near Chattanooga.
No. 5— } Central Kentucky.
No. 6— }
No. 7— }

The difference in evaporation between the best and the poorest of these coals was 26 per cent. This will serve to show that our monthly reports of coal burned per mile and per car hauled are of no practical value for comparison except when the coal is of the same quality.

As the rule, it may be said that the area of "fire grate" should be the least on which we can burn the amount of fuel necessary to generate the amount of steam required. What its area should be will depend largely upon the coal used. Careful tests must be chiefly relied on to determine the proper modifications needed to adapt a fire-box to the kind of fuel to be burned. When bituminous coal rich in gas is to be employed, it is important that the fire-box should be large enough to give time for the perfect combustion of the gases before they enter the tubes, and that the heating surface be as great and the boiler as large as possible within the limits allowable.

A large quantity of water in the boiler gives proportionate capacity for stirring up heat—accumulating it when the demand for steam is comparatively light and giving it out as required, without causing the great variations in water pressure which occur when boilers are deficient in capacity. A large boiler, like a fly-wheel, accumulates power at times when it would otherwise be wasted, and responds to sudden demands for it, for a time at least, without much apparent diminution of its force.

As regards the material for boilers and the character of workmanship, there need not be any very great differences of opinion. All should be as nearly perfect as possible. A boiler which is strong enough may be said to be as strong as it is worth while to make it, no matter how constructed. But a boiler may be strong enough when new, and not strong enough when old and weakened by corrosion, unequal expansion, the springing of sheets and the strains from the attachments. Theoretically and practically our boilers are amply strong when new, but are weakened unduly by the causes noted. Tests by hydraulic pressure of boilers long in service, convinces one that the margin of safety between the ordinary pressure and that necessary to produce rupture is unpleasantly narrow in many old boilers in service. The base of the dome seems to be the weak point in many old boilers insufficiently braced. Much improvement has been made of late years in increasing the strength of boilers, but there is room for further improvement in that direction. Perhaps our English friends go too far, but I am satisfied that in some particulars English practice could with advantage be imitated here. As the rule, the metal in our boiler shells is not thick enough, lacking rigidity and stiffness rather than strength, though the shell is not as strong, in proportion, as other parts of the engine, and it is generally the first part to need repairs. Within a few years the diameter of large boilers has been increased about 22 per cent., while the thickness of plates has been increased only about 16 per cent. Considering that the strain pressures have also been increased to the extent of perhaps 8 per cent., the thickness of the shell of a 54-inch boiler should be ¼ inch to be in proportion to what was considered necessary when the 44-inch boiler was in general use.

THE WOOTTEN FIRE-BOX.

Mr. Jacob Johann, Gen. Master-Mechanic of the Wabash, St. Louis & Pacific road, submitted a paper giving the results of some experiments with a Baldwin consolidated engine having the Wootten fire-box. The paper concludes with the following opinions in reference to the general construction of the boiler and the fire-box itself:

From my observations of this style of boiler I am led to believe that it would not prove successful in our service in burning bituminous coal, from the fact that owing to the peculiar shape of the fire-box and the general construction of the boiler itself, it would unquestionably give a great deal of trouble after a few years' usage in the shape of constant attention and repairs. In fact, during the short time in which the experiments were being made, it was necessary for us to remove the jacket immediately over the fire-box shell twice in order to calk the seams, which began to leak so badly as to absolutely require its being done. The flues also were a continued source of trouble owing to their leaking very badly, which I account for by the necessity of opening the damper in the smoke-box door in order to check the natural draft when the engine was standing still and at the same time steaming too freely. Allowing cold air to enter the smoke-box, in my opinion, causes a sudden cooling and contraction that is very disastrous to the life of the flues. Owing to the extra large heating surface, the steaming capacity of the boiler is more than sufficient to supply all the steam that would be required under any circumstances, and as far as this quality is concerned the boiler may be considered as being good. The irregular shape of the boiler as a whole, however, in my opinion, renders it liable to excessive straining, through its liability of being subjected to extremes in expansion and contraction, which in a comparatively short time would necessitate constant attention and repairs, and the increased cost of caring for this kind of boiler would not be compensated for by the benefits derived from the extra good steaming qualities. In general construction and arrangement of the machinery the engine was good and gave no trouble whatsoever.

In conclusion, I will say that in my opinion this class of engine, the consolidation, is the proper engine for through freight service in an economical point of view, owing to the capacity and traction of the engine being so great as to largely increase the size of the train hauled, and thereby diminishing the train service and expense.

STANDARD WIRE GAUGES.

Mr. R. H. Briggs, of the Mobile & Ohio road, chairman of the committee on this subject, made a report setting forth the necessity of an American standard wire and sheet metal gauge, both for manufacturers and consumers. It was found that manufacturers used different kinds of gauges, and that they were seemingly appreciated, not on account of their merits, but simply for the want of better ones. There was no existing standard that could be relied upon for uniformity and accuracy; and the committee would recommend for adoption the micrometer gauge made by the Brown & Sharpe Manufacturing Co., of Providence, R. I., as being the most accurate, the most easily adjusted and the most durable. It is also simple in construction, measures thousandths of an inch with precision, and when required, special size of the instrument can be made suitable for tool work. A motion was made and carried, to abolish the practice of ordering by gauges, and in future to order sheet metal, wire and other articles, by measurement.

THE JOY VALVE GEAR.

Mr. David Joy, of England, read a lengthy paper setting forth the merits and advantages of this gear for all kinds of engines, and especially for American locomotives, the valve chests upon which were placed on top of the cylinders, while with English locomotives they were placed between the cylinders; and consequently this feature had to be changed in order to secure the advantages of the gear to the last-named engines. The question had been raised whether the swaying of the American engine would not produce a rise and fall of the connecting-rods, including that part of them from which the motion to actuate the valve is taken; but it had been definitely settled that the objection on this score was of no practical importance. The use of equalizing levers between the springs, allowing one wheel to take up a part of the motion from the other, seems to imply that ordinarily there may be more movement of the axle-boxes here than on English roads, and that a varying action occurs at the crank end of the connecting-rod though the other has no motion. The amount consequently of which we would have to treat would be the amount existing at the point from which we take our motion for the valve, being from one-third to two-fifths of the amount of the motion at the pedestals. To prevent any slight disturbance of this kind, however, a frame has been devised which will move with the axle-box and give to the center of the slide case a vertical motion exactly equal to the vertical motion of the connecting-rod at the point where the motion is taken to actuate the valve; therefore, any irregularities arising from the action of the axle-box on turning curves or from uneven track is thereby entirely eliminated.

MAXIMUM WEIGHT ON LOCOMOTIVE DRIVING WHEELS.

MR. F. M. WILDER, of the New York, Lake Erie & Western, proposed the following question:

What is the Maximum Limit of weight to be allowed per wheel for Locomotives?

MR. WILDER: The maximum weight allowed on the driving wheels of locomotives varies very much upon different roads. Upon our road the limit which our Chief Engineer almost insists upon our keeping is 13,000 pounds, 12,000 pounds being the preferable amount. In building our consolidation engines we have put only 11,000 pounds on a single driver, and, if we can be allowed to place, as they are doing now in many instances, as high as 17,000 or 18,000 pounds upon a driver, we can build engines to do the work required with a less number of wheels, and it is a point we should ascertain as soon as possible.

THE PRESIDENT: I think it is not unusual at all to get from eight to nine tons per wheel in English practice. Now, if eight tons, for instance, can be carried on a wheel safely and without detriment to the wheels, tires or track, it is very important that we should know it.

MR. WILDER: I meant to say, if I did not, that they are already building engines on different roads, notably on the Reading road and also on the Pennsylvania road, which have eight to eight and a half tons—16,000 or 17,000 pounds—upon a single driver. Some time ago a paper was published by Mr. Chanute, Chief Engineer of the Erie road, upon the foot-prints of a locomotive, in which he showed diagrams of the spot or point of bearing as taken by putting tissue paper with a little manifold paper under a driving wheel. It showed that the amount of bearing that the driving wheel had upon the rail did not exceed over a tenth of a square inch. That would show that the pressure upon that point, if we had 12,000 pounds on the driving wheel, would be 120,000 pounds to the square inch. Bessemer steel will take a permanent set at about 150,000 pounds, and with 12,000 pounds on the driving wheel we would then be within 30,000 pounds of the elastic limit. Of course, as the metal gave way the point of bearing would become larger until it arrived at a point at which it would sustain the load; but, at the same time, it would give the rail a little permanent set (it might be very slight), but by continually increasing that weight we would soon destroy the cohesion of the molecules of the rail and they would peel off. I think you will find that on all these driving wheels, where we have got over 12,000 pounds, we have an excessive wear on them.

MR. SEDGLEY: I have always supposed that about 12,000 pounds was the limit for a road on which the rails did not exceed seventy pounds to the yard. Experience has led me to believe that your road must be very well ballasted and very well tied, to exceed that, particularly if you are running fast trains.

MR. DURGIN, Rhode Island Locomotive Works: A few months ago I placed an engine on the New York & New Haven road, and it has been in constant use ever since. I examined it the other day, and it showed the best results. They stated that they would not have a pound taken off it under any consideration. Those wheels have eleven tons on each wheel, 88,000 pounds on the four wheels. We have

been putting out passenger engines in the last year, running from fifty-eight to sixty and sixty-four thousand pounds. We have one passenger engine running now, which is running sixty-two and a half miles in one hour and fifteen minutes, making one stop. It has 62,000 pounds on the drivers, and I cannot see any perceptible wear on that more than on the others.

MR. FRY, New York, West Shore & Buflalo: pointed out the fact that with the increase of weight on driving wheels there has been an extraordinary decrease in the cost of transportation. The decrease in wages seems to have more than counterbalanced extra wear of tires and rails. Whatever the relations of cause and effect, it is interesting to note that these changes have come together. He gave some weights from actual practice: On the Erie, 26,000 lbs. per pair of wheels; on the Pennsylvania, 32,500 lbs. per pair of wheels; on the Central of New Jersey, 31,500 lbs.; on the Reading, 34,000 lbs.; on an English railroad, 40,320 lbs., and on the engine mentioned by Mr. Durgin, 44,000 lbs. per pair of driving wheels. It would be interesting to know how fast the tires wear with these loads.

MR. WILDER: Mr. Fry's remarks would convey the impression that the diminished cost of transportation was in some way connected with the increase of weight on the driving wheels. The maximum weight on a pair of drivers on our road (Erie) is, as Mr. Fry has stated, 26,000 pounds. I do not think that a more remarkable showing of the decrease of the cost of handling freight can be shown than by one of the tables of the annual report of the Erie road. As I remember, sixteen years ago, the amount we received per ton per mile was 2¾ cents or about that. The cost of handling was 1¼ cents or very near it. Last year the amount received per ton per mile was eight-tenths of one cent and the cost was about five-tenths, showing a decrease of 66 per cent. in the cost in 16 years. We have not increased the weight on any single point on our driving wheels. What we have put into service is the consolidation type of engine, putting on more drivers to keep the weight per wheel down to our limit.

MR. WOODCOCK, Central of New Jersey: Mr. Fry referred to our road as having considerable weight on our driving wheels. I will say that one of those engines has run for a little over a year. I have not noticed anything in the way of unusual wear about those engines. I think the quality of the tire has a good deal to do with the wear. I have noticed on some of our lighter engines that they usually have more wear than those referred to as having the excessive weight.

MR. DURGIN: I wish to state that on a double-end switch engine used on the New York & New Haven road, at the Harlem River, there are 88,000 pounds on four wheels. 64,000 pounds is the heaviest road engine we have; they vary between 58,000, 60,000 and 61,000.

THE PRESIDENT: There is another large item of saving, that is the matter of fuel. I think that anyone who has made the careful experiment will bear me out in the statement that a large engine burns no more, or very little more, working to her full capacity, than a small engine working to her full capacity.

MR. FRY: Confining ourselves more closely to the question of tires for the time, Mr. President, the large engines, as pointed out by Mr. Wilder, are not excessive in their weight on the tires; their weight can be distributed over four or five pairs of tires. I believe, in some cases, six pairs have been placed on very heavy engines. It is when heavy passenger service has to be done at a high rate of speed, that it becomes important to know how far we can go in putting weight on a pair of wheels. Very few of us would like to run our consolidation engines at a mile a minute, and yet it becomes necessary to haul passenger trains at that rate of speed; and, if a large passenger train has to be hauled and is divided into two, of course, the cost of hauling those passengers is double. Just as we have been consolidating our freight trains, so the tendency is now on our passenger roads to consolidate passenger trains. It is interesting to note that with the exception of the switching engine, spoken of by Mr. Durgin, the other engines that were mentioned by him as having heavy weights upon their wheels were all passenger engines. A few years ago, if we wanted to run trains at that speed, we had to run them in two or three sections, where we now put them in one.

New Postal Cars.

Five new railway post-office cars, for the fast mail service on the Baltimore & Ohio Railroad, between Baltimore and St. Louis, are now being completed at the Mount Clare shops. The cars are built by the company upon designs furnished by the Government, and are unique specimens of their kind. The exterior of the cars is white, with ultra-marine blue borders and gold lettering. They are numbered from one to five, and are inscribed on the sides, "Baltimore—Fast Mail—St. Louis," and "United States Post-office." In the interior the cars are finished in ash and cherry, oiled to show the natural grain. The ceilings are white. The forward section is fitted with stalls for mail bags. The center is taken up with a series of eighty inclined shutes for distributing newspapers. The matter for distribution is placed upon a long table in front of the shutes, each of which is numbered and labelled. When distributed it slides through by gravitation and falls into the pouches on the other side. In the rear section there are five hundred boxes of uniform size, arranged in a semi-circle for distributing letters. Each of the cars is lighted by ten polished brass Argand lamps, and heated by Baker heaters. The carriages and under-gear are painted black and light brown. Loughridge air-brakes are attached to each car. The five will soon be finished, when three more will be commenced for service between Baltimore and Chicago. The white and blue coats of the cars have a very pleasing effect in their new state, but railroad men think the color will not remain so bright after a short season on the road.—*Baltimore Sun.*

THE annual spruce-gum product of Maine is estimated at $40,000. It is sold chiefly to factory girls as a preventive of lockjaw and paralysis of the tongue from excessive talking.

Mr. P. H. Dudley on Locomotive Performance.

The following letter was addressed by Mr. Dudley to the Committee of the Master Mechanics' Association on Locomotive Performance:

The practical performance of the American Fast Express Locomotive of to-day far exceeds what was thought possible ten years since, and we know from experience that the improvements you are constantly making will increase its speed for heavy trains.

If the data in regard to fast 10 and 12-car trains were all collected it would leave no doubt as to the ability to run them at 50 miles per hour, on nearly level roads, or five and six cars at 60 miles.

Having drawn with my dynagraph car fast express trains upon various roads, I present a brief tabulation of part of a trip, showing the performance of an ordinary locomotive upon a train composed of three 8-wheel, and six 12-wheel cars, weight 250 tons, total weight of locomotive, ready for the start, 126,000 lbs., distributed as follows: tender 54,000 lbs., engine 72,000 lbs., 48,000 lbs. being upon the drivers, which were 6 ft. in diameter, cylinders 17 by 24 in., steam pressure gauge set at 135 lbs.

The first column shows the number of miles; the second, the time of run in minutes and seconds; the third, speed in miles per hour; the fourth, velocity of the wind in miles per hour; the fifth, approximate grades; the sixth, foot pounds of work, shown by the dynametrical curve, in drawing the cars per mile; the seventh, foot-pounds per minute expressed in horse-power; the eighth, approximate calculated foot-pounds of work required to move the locomotive itself, expressed in horse power; the ninth, the sum of columns seventh and eighth.

Column 8 will vary with every locomotive and could only be determined by direct experiment.

1.	2.	3.	4.	5.	6.	7.	8.	9.
No. of Mile.	Time in minutes and seconds per mile.	Speed in miles per hour.	Velocity of the wind in miles per hour.	Approximate grades.	Foot lbs. of work, shown by dynametrical curve per mile.	Foot lbs. of work per minute expressed in horse power.	Approximate calculated ft. lbs. of work required to move the locomotive in horse power.	Sum of columns 7 and 8.
1	2.54	20.68	...	Level.	24,116,233	252	...	...
2	1.34	38.31	6.	Down 5.3 ft.	20,035,253	369	221	590
3	1.22	43.90	4.	" "	17,793,214	398	292	690
4	1.16	47.34	3.	Level.	15,904,273	383	418	793
5	1.11	50.70	4.5	" "	14,871,528	382	406	788
6	1.13	49.31	6.	Up 13 ft.	15,284,616	383	406	789
7	1.11	50.70	6.	Down 18 ft.	14,458,430	369	426	795
8	1.08	52.89	5.	" 13 "	13,219,120	354	451	805
9	1.07	53.70	5.	" 8 "	11,560,744	319	483	802
10	1.09	52.10	5.	" 5 "	11,773,293	319	441	751
11	1.08	52.89	4.2	Level.	11,773,293	319	447	763
12	1.09	52.10	5.2	Down 8 ft.	12,806,038	337	456	793
13	1.10	51.43	6.	Level.	12,392,940	324	443	767
14	1.10	51.43	4.5	"	12,806,038	330	426	756
15	1.10	51.43	4.	"	13,425,085	351	420	771
16	1.10	51.43	3.5	"	13,290,136	345	415	760
17	1.08	52.89	3.	"	13,838,783	371	443	814
18	1.08	52.89	5.	Down 6 ft.	13,219,136	354	464	818
19	1.08	52.89	3.	" 2 "	13,219,136	354	443	797
20	1.11	50.70	3.5	Up 10 ft.	14,838,783	379	406	785
21	1.13	49.31	3.	" 10 "	14,458,430	362	384	746
22	1.08	52.89	3.1	Level.	12,392,940	332	443	775
23	1.07	53.70	3.1	Down 10 ft.	12,186,391	333	402	797

In starting the train, the locomotive would record a tension of 11 to 12,000 lbs. for one or two hundred feet of distance, then by hooking up the cut-off and other causes would reduce to 2,800 to 3,000 lbs. when the speed of 50 miles an hour was attained in the fifth mile. As the speed increases, the resistance of the air against the locomotive becomes greater and more of its own power is required to move itself, and less can be used to draw the cars. The increased foot pounds of work in the first four miles, show less than one-half of that required to overcome the inertia of the train, for the speed of 50 miles per hour. Inertia is an important element of train resistance, especially on local trains, as it limits the speed for short runs and must be considered in choice of locomotive for the service. In starting a train the working adhesion of the steel-tired drivers, on dry steel rail, is usually above 33 per cent. of the weight upon them, and reduces as the speed increases, but in what ratio, not ascertained by experiment. From 18 to 20 per cent. has been obtained at 56 miles per hour, the percentage of slip not exceeding 1¼ per cent.

The great and substantial improvement in the permanent way of late years, permits a higher percentage of adhesion than formerly.

One of the most important features shown in the tabulations, is the quick steam generating capacity of the boiler, 800, 900 or 1,000 horse power developed in the brief time of one minute may be expressed in figures, but the mind fails to gain any adequate conception of the enormous power. At 135 lbs. steam pressure, 300 or 338 lbs. of water will be evaporated per minute with a consumption of 40 or 50 lbs. of coal; this requires a very rapid generation of heat, and its quick absorption by the water.

Owing to the large amount of heat which is absorbed by the water, before it makes any pressure of steam, a less proportion of heat units are required to do the work at high pressures than low, therefore the rate of transmission per minute will be less for the heating surfaces.

The Swiss and German locomotives are reported to carry from 165 to 180 lbs. pressure as a rule, with exceptional ones at 225.

In drawing fast and heavy trains on various roads the greatest difficulty in making time has been want of steam. There are so many contingencies which may daily arise, of winds, storms, etc., that provisions must be made for a greater capacity than is required for ordinary occasions. In observing what the train resistance would be, for the above mentioned train, about 11 lbs. per ton, it must not be concluded that this would also be true of any other weight of train; the resistance of the same number and class of cars increases in same ratio as the speed increases; and as we increase the tonnage number of cars, the amount per ton decreases.

Another important element of train resistance is the condition of the track; having upon my instrument apparatus for mechanically determining the condition of the track, it is found even on the best roads, each mile cannot be in equal condition, owing to increased wear and quality of rail. On grades is this especially the case, and at stations where many trains stop and start. Experiments upon all classes of passenger trains are too limited to give any reliable formulas for general use. For long and heavy trains I have found the resistance per ton much less than that given by the latest formulas.

Yours truly, P. H. DUDLEY.

THE New York, Chicago & St. Louis road has 487 miles of track laid, of which 335 are ballasted. This leaves about 26 miles main track yet to lay, to complete the main line from Buffalo to Grand Crossing, Ill.

How Blue Prints are Made.

The Locomotive gives the following method of copying tracings by the blue print process:

The materials required are—

1. A board a little larger than the tracing to be copied. The drawing-board on which the drawing and tracing are made can always be used.

2. Two or three thicknesses of flannel or other soft white cloth, which is to be smoothly tacked to the board to form a good smooth surface, on which to lay the sensitized paper and tracing while printing.

3. A plate of common double-thick window glass of good quality, slightly larger than the tracing which it is wished to copy. The function of the glass is to keep the tracing and sensitized paper closely and smoothly pressed together while printing.

4. The chemicals for sensitizing the paper. These consist simply of equal parts, by weight, of citrate of iron and ammonia, and red prussiate of potash. These can be obtained at any drug store.

5. A stone or yellow glass bottle to keep the solution of the chemicals in. If there is but little copying to do, an ordinary glass bottle will do, and the solution made fresh whenever it is wanted for immediate use.

6. A shallow earthen dish in which to place the solution when using it. A common dinner-plate is as good as anything for this purpose.

7. A brush, a soft paste-brush, about 4 inches wide, is the best thing we know of.

8. Plenty of cold water in which to wash the copies after they have been exposed to the sunlight. The outlet of an ordinary sink may be closed, by placing a piece of paper over it with a weight on top to keep the paper down, and the sink filled with water, if the sink is large enough to lay the copy in. If it is not it would be better to make a water-tight box about 5 or 6 inches deep, and 6 inches wider and longer than the drawing to be copied.

9. A good quality of white book-paper.

Dissolve the chemicals in cold water in the following proportions: 1 ounce of citrate of iron and ammonia, 1 ounce of red prussiate of potash, 8 ounces of water. They may all be put into a bottle together and shaken up. Ten minutes will suffice to dissolve them.

Lay a sheet of the paper to be sensitized on a smooth table or board; pour a little of the solution into the earthen dish or plate, and apply a good even coating of it to the paper with the brush; then tack the paper to a board by two adjacent corners, and set it in a dark place to dry; one hour is sufficient for the drying; then place its sensitized side up, on the board on which you have smoothly tacked the white flannel cloth; lay your tracing which you wish to copy on top of it; on top of all lay the glass plate, being careful that paper and tracing are both smooth and in perfect contact with each other, and lay the whole thing out in the sunlight. Between eleven and two o'clock in the summer time, on a clear day, from 6 to 10 minutes will be sufficiently long to expose it; at other seasons a longer time will be required. If your location does not admit of direct sunlight, the printing may be done in the shade, or even on a cloudy day; but from one to two hours and a half will be required for exposure. A little experience will soon enable any one to judge of the proper time for exposure on different days. After exposure, place your print in the sink or trough of water before-mentioned, and wash thoroughly, letting it soak from 3 to 5 minutes. Upon immersion in the water, the drawing, hardly visible before, will appear in clear white lines on a dark blue ground. After washing, tack up against the wall, or other convenient place, by the corners to dry. This finishes the operation, which is very simple throughout.

New Parlor Cars.

On Monday next, says the Boston *Herald*, of July 15, two handsome parlor cars are to be put on the through train of the Boston & Maine Railroad, and two more are nearly completed. The two cars already arrived are numbered 123 and 146, and for a few days past they have been running on local trains (locked, however) for the purpose of getting into smooth running condition. Both cars are painted outside a handsome dark maroon, and have a panel on each side marked "Parlor Car," with the number above. No. 123 is one that was wrecked in the Cole's Corner accident last January, but it has been thoroughly overhauled, and is in effect a new car. It has compartments at either end, with a general open parlor in the centre. The floor is covered with a handsome Wilton carpet; large cushioned revolving chairs are provided; the windows, all double size, are furnished with self-acting curtains and rich lambrequins. The interior finish is of mahogany, birch and maple. No. 146 is a new car, and differs materially from any others on the road. The interior finish is mainly California mahogany, though other hard woods are worked in to give a pleasing variety. The windows are alternately narrow and wide ones, and this arrangement brings each chair opposite a window. At one end of the car is a state-room, extending across the car, provided with four large revolving chairs and shut off from the rest of the car by a door. Adjoining this state-room is a passageway, on one side of which is a double room for ladies, one of which contains a marble bowl and a small state-room for two persons. On the other side is a wash-room for gentlemen, a heater-room and a small state-room. The balance of the car is occupied by the main parlor, which is furnished with 16 large, handsome and comfortable arm-chairs, upholstered in red plush. The windows are furnished with curtains and lambrequins, like those in No. 123, and the floor is carpeted with a beautiful Wilton. Both cars are provided with double lamps, and the windows have gauze screens, besides cinder fenders outside. The running gear is of the best, and all the modern appliances for safety are provided. The cars come from the company's shops, and will prove welcome additions to the rolling stock of the road.

Communications.

Setting Locomotive Valves.

To the Editor of the National Car-Builder:

The setting of locomotive valves is a simple affair when the elementary principles are first understood. In days gone by, it was a job of considerable length, and frequently occupied from a day to two days, and men who could do the work were few and far between, and especially so when the engine had independent cut-off valves. In those days, setting valves by a tram and marks on the stem had not originated, and the work was invariably done with the chest cover off and a supply of copper or wooden wedges for "feeling" the openings, the wedges being usually carried in the vest pocket of the gang boss. With the link motion and rollers to do away with "pinching," the operation is a short one, and after finding the centers, the balance of the work may be performed in one revolution of the drivers.

To find the centers, the engine should be moved either by the rollers or by pinching the engine ahead until the cross-head has traveled up to within one or two inches of the end of its stroke. In Fig. 1, the crosshead *a* is supposed to be in this position. A centre punch mark *f* is made on the block *b* between the guides, and another *g* on the cross-head. A pair of compasses *e* are set to these marks; *c c* being the guides, and *d* the cylinder head. With the engine in this position, make a prick-punch mark on the forward wheel guard as at *a*, Fig. 2, place a pair of compasses or tram *c* in the mark *a*, and make a short mark with the other on the side of the tire as at *b*, crossing the line *d d*, which is marked from the center of the axle. Pinch or revolve the drivers forward until the crosshead has reached the forward end of the guides and traveled back until the compasses *c* Fig. 2, will almost drop into the centers. A bar should then be placed between the block *b* and crosshead, to take out any slack or lost motion that may exist, and if the compasses will not then drop in, pinch the engine a trifle, and again take up the slack with the bar until the compasses will just come into the center punch marks again. With the tram *c* in the centre *a* on the wheel-guard, make another mark *e* on the side of the tire, the portion of the tire on which the mark *e* is made having advanced up to the end of the tram, a point *f* on the line *d d* centrally between *e* and *b* should be found and located by a center punch mark and a small circle drawn around it, which locates the forward center when the engine is pinched ahead, and the point of the tram *e* falls into the mark *f*. When exactness is required, the engine should be under a head of steam, and in getting the marks *b* and *e* the engine should be pinched ahead, as this brings the main axle and box against the forward pedestal as when running. In getting the mark *e*, the cross-head is dragging the piston, and the lost motion in the main rod is on the opposite end to what it would be if the engine were using steam, hence the bar is introduced to take this up, and acts identically as the pressure of steam on the piston would. When setting the back up motion, the engine should, of course, be pinched backward, forcing the box against the back pedestal, and the bar used to take up the lost motion in the rod, etc. This is frequently disregarded, and the error is generally so small, providing the rods have been keyed up and the wedges set up, that it makes no practical difference. The back center and the forward and back centers on opposite side are found by same means as already explained.

After the valves of an engine are faced and the valve-stem connected to the valve, but disconnected from the rocker-arm, the valve should be pushed forward until it just closes the port, line and line, or a thin piece of tin introduced into the port and the valve pushed up to it. A tram, Fig. 4, is then set in a center on the cylinder as *g*, Fig. 3, and a small arc *a* drawn on the stem with the other end of the tram *h*, the valve is then placed so that the back edge of valve and back port are line and line, and the second arc *b* drawn with the tram *h*. A straight line *c c* is then drawn lengthwise, as shown, and the chest cover put on. In order to take the subject from the bottom up, we will assume that the eccentrics are loose on the shaft, and in an entirely wrong position. In Fig. 5, *J* is the crank-pin, *D* go ahead eccentric, and *E* the back-up eccentric. If the engine were a straight line engine, the eccentrics would be nearly opposite each other, that is, nearer to the crank-pin *J* by the lap and lead *c*, as is shown in Fig 5; *i i* being center line of engine; *h h* a perpendicular line to *i i*; *f g* center lines of eccentrics; *a* shaft, and *b b* circles in which centers of eccentrics travel. Although it is not necessary, it simplifies matters considerably to shift the eccentrics on the shaft until they stand in as correct a position as can be determined by the eye, and fastened temporarily, remembering that the go-ahead eccentric on ordinary engines stands with its full part above the shaft, and slightly inclined to the pin when the engine is on the forward center, the back-up eccentric below the shaft, and inclined similarly, and also that when the engine is in either motion full gear, the eccentric operating the valve at that time always *follows* the pin, assuming of course, that the engine has a rocker-shaft.

With this preliminary explanation, we may now proceed to set the valves by placing the engine on the forward center with the reverse lever in the full go-ahead notch.

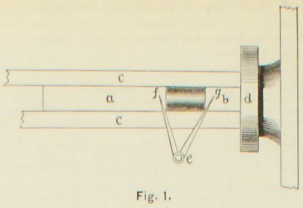


Fig. 1.

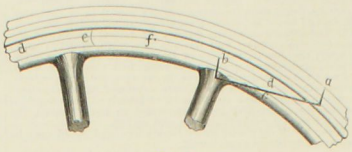


Fig. 2.

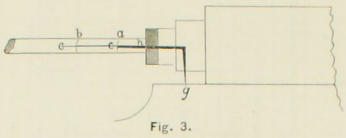


Fig. 3.

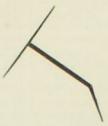


Fig. 4.

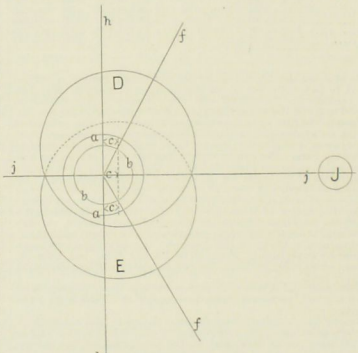


Fig. 5.

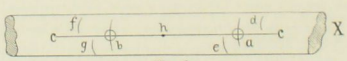


Fig. 6.

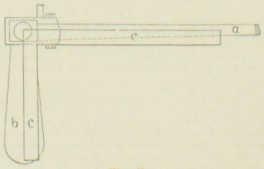


Fig. 7.

Fig. 8.

With the tram shown in Figs. 3 and 4 in the same center on cylinder *g*, Fig. 3, a short mark is made on the valve-stem *above* the centre line *c c* Figs. 3 and 6, which in Fig. 6 we will assume is *d*. Pull the reverse lever into the full back-up notch, pinch the engine by the centre and then back (to take up the lost motion) until she is again on the center, and make another mark on the stem with the tram *below* the center line *c c*, which we will assume is *e*. The engine is now pinched ahead with the lever in the forward notch until the crosshead on the opposite side of the engine reaches the centre, when the stem on that side is marked with the tram above its centre line *c c*, the lever pulled into the back-up notch, the engine pinched by the center and back to the center as previously explained, and when on the center another mark is made on the stem below the center line *c c*, as was previously done on the first side. With the lever in the go-ahead notch, the engine is pinched until the cross-head marked on the first side is on the back center, and the stem is again marked above the line *c c*, which mark we will say falls at *f*. With the lever in the back-up notch, the engine is pinched a little past the center, and then to the center again, and another mark made on the stem below the line *c c*, which mark we will say falls at *g*, Fig. 6. With the lever in the forward notch, the engine is pinched ahead until the cross-head on the opposite side reaches its other center, and its stem marked above the line *c c*; the lever is then placed in the back motion, the engine pinched by the center and back again, and the stem again marked below the line *c c*.

It is evident now that the engine has been pinched one complete revolution, and as each crosshead reached the center, the stem was marked above the line *c c* when the lever was in the forward notch, and marked below the line when the lever was in the back-up notch. The significance of marking the stem above and below the line is to distinguish the situation of the valve when the lever is in the forward or back motion, as the stem is marked above the line *c c* when the lever is in the forward motion on either center, and below the line, when the lever is in the back-up motion on either center. Both stems now have (in addition to the marks *a b*, Fig. 6, made to indicate where the valve was line and line) four other marks. It is evident also that the marks *a* and *b* represent the edges of the valve—*a* the forward edge and *b* the back edge—and that the point of the tram being stationary, stands for the outside edges of the steam ports. It may help some to remember that when the marks made above or below the center line *c c* stand outside of the marks *a b*, indicating the edges of the valve, *lead* is indicated, and when inside the marks *a b*, *lap* is indicated.

It must also be remembered that all changes in the length of rods must be made in the *eccentric* rods, and that this can be accomplished, a point *h*, Fig 6, is found centrally between *a* and *b*, and the valve stem moved until the tram point falls into *h* when the valve is over the center of the ports, if the valve stem has a right and left hand nut on it, or if the rocker shaft end of the valve stem is fitted with boxes and key, the valve stem or rod must be lengthened or shortened until the rocker-arm stands square with the valve stem, when the valve is central over the ports, as shown in Fig. 7, in which *a* is the valve stem, *b* the rocker-arm, and *c a* square whose edge cuts the centre of the valve stem, center of valve stem, rocker wrist and center of rocker shaft, this having been performed before the stem is marked with the marks *d e f g*. It must also be remembered that when there is *unequal* lead the eccentric rod should be lengthened or shortened, as the case may be, by *one half of the difference* of the lead. That is, if for round numbers the lead on one end was $\frac{1}{4}$ inch, and on the other $\frac{3}{16}$ inch, the difference would be $\frac{1}{16}$ inch, and half the difference would be $\frac{1}{32}$ of $\frac{1}{16}$ or $\frac{1}{32}$, which would be the correct amount to change the eccentric rod by.

If there is unequal lap at both ends, take one half of the difference as for lead. If there is equal lead or equal lap at both ends, no change in the rods is necessary, as it then only remains to shift the eccentric until the proper amount of lead is obtained—that is, shift the eccentric toward the crank for more lead, and from it for less lead. If there should appear to be lead at one end and lap at the other, *add* the lap to the lead, and take half of the *sum*; that is, if the lap were $\frac{1}{8}$ inch, and the lead $\frac{1}{4}$ inch, we would have $\frac{3}{8}$, and one half of the same would be $\frac{3}{16}$, the proper amount to change the length of the eccentric rod.

Examining Fig. 6, in which *X* is forward end, we find that when the lever is in the forward motion and the engine on the forward center, there is an amount of lead equal to the difference between the marks *a* and *d*, which is taken in a pair of compasses and laid down on a smooth piece of metal, as the guides, or on the valve stem itself for that matter. This distance is represented in Fig. 8 by the dots *a d*. Examining the forward motion with the engine on the back center, we find an amount of lead equal to the difference between the marks *b* and *f*. This is taken in a pair of compasses and laid down as *b f*, Fig. 8. It is evident that there is more lead on the back end than the forward end, by the distance between *d f*, Fig. 8. *X* is a center point between *d* and *f*, and *x f* or *x d* is the proper amount to *lengthen* the go-ahead eccentric rod, as it is clear that the valve is the distance *x f* too far ahead; and to bring it back we must bring back the top arm of the rocker-shaft, which necessitates the lower arm going forward. The distance *x f* may be taken in a pair com-

passes, and, with the engine on the back-center and the lever in the forward notch, we may lay off forward from *f*, Fig. 6, the distance *x f* with the compasses, and shift the eccentric rod until the tram falls into the mark just made on the stem, when the forward eccentric rod is of the right length; or a man under the engine may make a mark on the eccentric strap butt, and one on the eccentric rod, and take this distance in a pair of compasses. The distance *x f* he may lay off back from the mark on the eccentric rod, and shift the rod until the second mark drops into the point of the compasses. This assumes that the rocker-arms are equal in length. If they are of different lengths, the change in length of eccentric rod will be in proportion to length of the arms.

Examining the back-up motion, we see that there is an amount of lap on the forward end equal to *c. a.*, and lead on the back end equal to *g b* Taking this lead in a pair of compasses we lay it off similarly to Fig. 8, and then add the lap to it, take one half of the sum in a pair of compasses. This shows that the valve is too far forward, and the back-up eccentric rod must be lengthened by one half of the lap and lead. As the rods are now of the right length, it alone remains to shift the eccentrics to secure the proper lead, unless this was done when each rod was changed. It is customary to run over the valves a second time to remedy any defects, and to insure correctness. A much shorter way of placing an engine on the center, is when the crosshead is within two or three inches of the end of the stroke, to smoke the piston rod with a lamp, and hold a scriber firmly on the guides, the end bearing on the smoked portion of the rod. By pinching the engine till the crosshead reaches and passes the center, a line will be drawn on the soot on the rod. If the engine is pinched back until the scriber reaches the end of the line again the engine is on the center for all practical purposes.

It is necessary to see that the links stand equally with each other, so as to insure each side of the engine cutting off equally. Some engines are built with a right and left hand nut on the link hanger for this purpose, or raising or lowering the tumbling-shaft boxes, or changing the length of the hanger in the blacksmith shop, will accomplish the same result. The length of the reach-rod should be obtained by blocking up the link until the link block stands midway between each end, placing the reverse lever in the centre of the quadrant, when the distance between the arm of the tumbling shaft and reverse lever will be the correct length.

To mark the quadrant it is necessary to determine first what points it is desired to have the engine cut-off at. Suppose it is at 6, 8, 10, 12, 14, 16 inch, etc. Place the engine on the forward center, and pinch her until the crosshead has travelled back six inches, pull the reverse lever up until the valve just closes the port, clamp the lever and mark the quadrant for the 6 inch notch, and so on for the rest.

It is without doubt best to set the valves so that they are square at full stroke, and if in notching her back a faulty cut-off is found, it is no fault of the gang boss, as the trouble lies in a badly designed link-motion. By throwing the back-up motion out, the forward motion is frequently helped when a badly designed link-motion is the trouble; but it seems to the writer that it is the duty of the gang boss to set the valves square at full stroke, and not try to cover up the blunders or ignorance of the designer by robbing Peter to pay Paul, for such it is when the back-up motion is distorted to help the forward. The writer has found that large railroad companies generally build a better link-motion than contract shops do. The link gear of the latter is hardly ever correctly equalized. It cuts off unequally in the shortest notch, and gets worse as the lever is dropped down; while the link gear designed in road shops frequently cuts equally from 6 inches up to 10 or 12 inches, and then runs into a small increasing error as the full stroke is approached, which error at its maximum is as small as most contract shops get their shortest cut-offs down to.

FRANK C. SMITH.

Locomotive Driving Boxes.

To the Editor of the National Car-Builder:

What I said on this subject in your June number was intended to apply only to engines of the Rogers' build, or to those where the pedestals are not at right angles with the center line of frame. All builders who make the wedge and shoe in the shape of a wedge, invariably locate the center of driving shaft in the center between the pedestal jaws, and any engine of this class that is not so built is not built correctly. The engine referred to by Mr. Smith in his article printed in your July issue, as being built with the axle-center located back of center, between the jaws, could not have been built correctly and must have been "unmechanical," otherwise the mistake referred to by him could not have been made. Engines are often built to sell, as stated by your correspondent, Mr. Huntington, and the rods of this engine were doubtless made too long, else why the mistake, if such it can be called, by the rebuilder? Changing the length of rods in the blacksmith shop is simply to make them the proper length in a "mechanical way," and not by shifting the brasses, which would necessitate making one brass thicker than the other; or, as Mr. Smith says, "by stretching a center here or there to make her come right." The plan set forth in my former letter requires *no* centers except with engines having straight or parallel shoes, and then only to determine the location of the shaft, which is easily done on straight-edge, as was shown. I find length of rod on engines with parallel shoes in the same way as described by Mr. Smith: locating the same on straight-edge, and then by subtracting half the distance from between this center and front edge of straight-edge, we have thickness of front shoe for the remainder.

What I have said on this subject has been "the result of observation of other plans and their weak points;" and I would suggest to your correspondent that when he fits up the next engine with new shoes and wedges, he will do well to examine his large T square, and I am satisfied that he will find it contains several large "black crows" whose wings can be clearly seen when he calls several men to help him handle it. *Suum cuique.*

W. F. TEAT, JR.

MONTGOMERY, Ala., July, 1882.

The Dynagraph and Train Resistance.

To the Editor of the National Car-Builder:

Mr. P. H. Dudley in his letter to the committee of the Master Mechanics' Association, gives the results of a trial of his "Dynagraph" on a 23-mile continuous trip of a fast passenger train, which are full of interest for railroad men. The need of more definite information on the subject of train resistance is obvious; and it is believed that Mr. Dudley is doing a much needed work on which may be based important improvements in more than one branch of railroad engineering. The method of estimating the various elements of train resistance by means of formulas based on experiments, either meagre themselves or else made under old-time conditions in Europe, has, no doubt led many American engineers astray in practice, and been the cause of much waste of energy and money. An examination of the table accompanying Mr. Dudley's letter will show that the line of road over which the single trip was made was practically level, there being only three miles of the distance that show the trifling ascent of about 1 in 400. This may be considered as more than compensated for by the excess of descending grades, which aggregate 47.6 feet in the 23 miles, or two feet to the mile in excess of the aggregate opposing grade.

The wind in miles per hour was also very light, and supposing it to have been dead ahead, the average of 4.35 miles per hour for the trip, in excess of the resistance due to the forward motion of the train, was an insignificant element in the problem of opposing forces. Running in still air the anemometer should have indicated 50, if that was the speed per hour at which it moved forward. So that with a six mile head wind the indication should be 56. A wind 4½ miles per hour is valued at less than 3 ounces per square foot of cross section of the train, when dead ahead. But this estimate refers to flat surface moving forward squarely opposed to the direction of the wind. It is probable that the curves of the road, whatever they were, varied the angle at which the wind pressed upon the moving train. The wind is thus a very indefinite item of train resistance, important though it is. The resistance of still air to an advancing train is also quite indefinite. At low velocities it is nearly as the square of the velocity; "but it gradually increases more and more above that proportion as the velocity increases" (D. K. Clark). Thirty miles per hour is counted a high wind, and produces a pressure of about 5 pounds per square foot upon flat surfaces. Sixty miles an hour, according to this rule, would produce $30^2 : 60^2 :: 5 : 20$—more than four times five, if 60 miles may be considered a high velocity according to the author quoted.

In this connection the thought naturally occurs as to the speed in contemplation for our flying trains in the near future, $30^2 : 100^2 :: 5 : 55$ and more. This, Dr. Lind informs us, by inference, would equal an astonishing and devastating hurricane. It is sufficient, however, for the present to deal with such speeds as are obtainable to-day. The information that we now have, without pretending to be exact, leads to the conclusion that a train of full sized cars moving at the rate of 60 miles per hour in still air, meets with an air resistance of about 1,000 pounds. This resistance is largely overcome by the locomotive, and in so far is not accounted for by the "dynagraph." This element in train resistance increases the tension on the draw-bar only in the proportion that the cross section of the cars exceeds that of the locomotive, due allowance being made for rounded and oblique surfaces and air eddies between the cars. The locomotive should therefore have our sympathy in the matter of head wind pressure, although it appears to expend such a large percentage of its force in moving itself, and so little in the useful work of drawing the train at high speeds. The partial vacuum in its wake implies atmospheric pressure on the rear of the train, as though it were a piston moving in a tube. No draw-bar at all would be needed if this condition could be realized. The train would follow a piston that would exhaust the air in a air-tight tube in which both fitted, with a force of 2,000 pounds to the square foot, or 150,000 pounds on a cross section of 75 feet.

In reading Mr. Dudley's letter the following paragraph will no doubt attract attention: "The increase of the foot pounds of work in the first 4 miles shows less than one half of that required to overcome the inertia of the train for a speed of 50 miles per hour." In apparently strange contrast with it is the statement just before it, that, "In starting the train the locomotive would record a tension of 11,000 to 12,000 lbs. for 100 or 200 feet; then by hooking up the cut-off, and other causes, would reduce to 2,800 to 3,000 lbs., when the speed of 50 miles an hour was attained at the fifth mile." In the accompanying table I have extended the figures of Mr. Dudley so as to show the average resistance for each mile, and the averages of train and engine resistance and the percentage of each per ton of train based on Mr. Dudley's data, which must be recognized by every engineer as a valuable addition to our knowledge on this subject.

The method of calculating the average resistance per ton of train, shown in the table, is as follows: The speed in feet per minute, 5,280, divided by the time of making that distance, is multiplied by the load or weight of the train in tons. The horse-power (column 7, in Mr. Dudley's table) multiplied by 33,000, are divided by the first product. In the form of an equation, wherein *R*, the average resistance in pounds per ton of train, is the only quantity not given in Mr. Dudley's table, it is $R = \frac{Fp}{S\ T}$ (1), *Fp* being the foot pounds per minute, *S* the speed in feet per minute, and *T* the weight of the train in tons. This equation is deduced from $Fp = S\ T\ R$, which may be used to calculate the net horse-power exerted at the draw-bar, *R* being taken from a table of resistances.

A simpler method for the present purpose is to divide $F\,p\,m$, the foot pounds per mile, given in colum 6 of Mr. Dudley's table, by the product of the load into the feet per mile, which gives a constant number 1,320,000 for a divisor: $\frac{F\ p\ m}{5280 \times T}$ (2) For example, the average speed of the first mile which was made in 2 minutes and 54 seconds, equal to 2.9 minutes, was $\frac{5280}{2.9} = 1821$ feet per minute, and the horse-power shown by the dynametrical curve was 252. Thus, $\frac{252 \times 33000}{1821 \times 250} = 18.25$ or by the second method $\frac{24,116,233}{1,320,000} = 18.25$.

MILES.	SPEED.	AVERAGE RESISTANCE PER TON OF TRAIN.		
	In miles per hour.	of the train in pounds.	of the engine in pounds.	Total in pounds.
1	20.68	18.25	....	....
2	38.31	15.17	7.59	22.76
3	43.90	13.45	10.12	23.57
4	47.34	12.05	12.86	24.91
5	50.70	11.26	12.05	23.31
6	49.31	11.58	15.15	26.73
7	50.70	10.95	12.57	23.52
8	52.89	10.01	12.75	22.76
9	53.70	8.76	13.62	22.38
10	52.10	8.92	12.74	21.66
11	52.89	8.92	12.66	21.58
12	52.10	8.93	13.87	22.80
13	51.43	9.39	12.90	22.37
14	51.43	9.70	12.66	22.36
15	51.43	10.17	12.31	22.48
16	51.43	10.00	12.16	22.16
17	52.89	10.47	12.55	23.02
18	52.89	10.00	13.13	23.13
19	52.89	10.00	12.54	22.54
20	50,70	11.16	12.06	23.22
21	49.31	11.25	11.45	22 70
22	52.89	9.38	12.52	21.90
23	53.70	9.15	13.05	22.20
Averages.....	49.37	10.73	12.17	22 90
Percentage...	....	46.80	53.20	100.00

The resistance shown as the average of the first mile, run at the rate of 20.68 miles per hour, is more than double that which is found in some tables which are calculated from formulas that relate to uniform speed, while here we have an increasing speed. With Mr. Dudley's letter before us we may be able thus to appreciate resistances due to starting a train and increasing its velocity till its maximum speed is attained. If the force exerted at the draw-bar for the first 100 or 200 feet, when the tension was stated to be 11,000 to 12,000 pounds, or say $\frac{11500}{250} = 46$ pounds per ton, should be estimated separately, it would show that nearly the full power of the engine was applied to draw the train at the then slow but increasing speed. Strict economy demands that the enormous power exerted in bringing a train to full start, and which is stored afterwards in the train and engine moving at maximum speed, should be given out again in moving the train after steam is shut off preparatory to stopping at the end of the journey.

ENGINEER.

Native Woods for Car Building.

To the Editor of the National Car-Builder:

For many years past it has been the practice to use foreign cabinet woods to a great extent for the interior finish of passenger cars. Whether these imported woods are preferred on account of their superior strength and beauty, or merely because they are considered to be more stylish, like imported fabrics for clothing, is not quite clear. Our car-builders, however, are beginning to find out the value of our home resources in this respect, and much attention is now given to the quality and adaptation of our native woods for ornamental car work.

In New England, and in the northern parts of New York, there are immense quantities of the different kinds of birch, a species of timber that has hitherto been but little appreciated for constructive and ornamental purposes. The black, yellow and white varieties grow to a great size, and can be cut to almost any desired length, width and thickness. They are close-grained and are susceptible of a

brilliant polish. The natural colors of these three varieties comprise various shades, a judicious arrangement of which makes a beautiful and harmonious finish, and each kind is also a very strong or "smart timber," as the mechanics say. A great many of these trees have been cut down and burned to get them out of the way, yet there are enough left to make it an object for car-builders to look after what remains. The strength and durability of this timber renders it suitable for any part of car construction where these qualities are indispensable.

The varieties of our native ash have also been overlooked to a great extent in the matter of nice car work. This timber abounds in almost all localities where birch is found, and in many places also where there is no birch. There are so many distinct varieties of it that it is difficult to designate any particular one as being superior to others. There are several kinds of what is known as black ash. When this grows in low, marshy grounds, it is usually of an inferior quality; but that which grows in more favorable localities, although differing widely in color, grain and strength, is very suitable for car work. As a rule it is too springy for frame timbers; but for inside finishing it is admirable, and some passenger coaches that have been finished entirely with it are very beautiful. The white ash, like the black, has many grades of color and fineness of grain. It is not so elastic, has greater firmness of fiber, and takes a beautiful polish. Then there is the blue and gray ash, and other varieties too numerous to be specified, all of which are adapted more or less to the substantial or ornamental requirements of car construction.

The cherry, both black and red, is indigenous to the same localities where birch and ash are found, and is a valuable wood for general cabinet work. The black cherry is hard and glossy in its texture, and needs no art in the treatment of it to make it a very attractive material in car work. The red cherry is often mistaken for mahogany, and in many cases rivals it in beauty. I have seen a fine counter in a drug store, half of which was cherry and half mahogany, and so close was the resemblance that even experts were puzzled to say which was which. There are considerable quantities of cherry in some sections of the country, and it is better to make good use of it than to go abroad for wood that costs more and is no better.

Black walnut is too well known to deserve comment, but it may not be amiss to say that not many years ago it was extensively used for various kinds of furniture, inside finishing and wherever style was wanted. Its principal defect is a tendency to shrink, even when well seasoned, but this is not a very serious drawback. It went out of fashion, and foreign woods have largely taken its place. Of late, however, it is becoming scarce, and looks better than it did a good while ago when it was so plenty and cheap as to be used for farm fences out west. It is good enough now to make veneers of. It has also been discovered that some kinds of oak make handsome car work. Butternut, basswood and whitewood make good panels, and the maples will never go out of fashion as long as there is a tree of them left in the country. It is more than likely that as the consumption of timber for cars increases—and it is bound to increase—our native resources will be developed to a much greater extent than they are now, and instead of importing this class of material, our own native product will be depleted by an increasing demand for export.

WM. S. HUNTINGTON.

Railroad Operations in 1881.

Poor's "Manual of Railroads" for the current year gives the following results of railroad construction and operation in the United States for the year 1881:

Number of miles in operation at close of year	104,813
Number of miles constructed during year	9,358
Excess over construction in any previous year	2,159
Cost of new construction at $25,000 per mile	$233,750,000
Expended on lines in progress	75,000,000
On tracks, stations and equipment of old roads	100,000,000
Total amount expended in construction	400,000,000
Gross earnings of all the roads	725,325,119
Increase of earnings over 1880	110,000,000
Gross earnings per head of population	13.60
Net earnings of all roads	270,654,119
Increase of net earnings over 1880	21,500,000
Dividends paid	93,344,200
Increase of dividends over 1880	16,228,789
Cost of operation (62 p. c. of gross earnings)	449,565,071
No. of persons employed in operating*	1,200,000
No. of persons employed in construction	400,000
Total number employed	1,600,000
Total number of engines	20,116
Total number of passenger cars	14,548
Total number of baggage, mail and express cars	4,976
Total number of freight cars	648,295

A noteworthy feature of the report is the large increase in operating expenses as compared with the increase in gross earnings, the increase in net earnings for the year being only about 20 per cent. of the increase in gross earnings.

The new mileage for 1882 is estimated at about 10,000 miles, one half of which is already constructed, making the total railroad mileage of the country at this date 109,000 miles, nearly a third of which has been built within the last six years. These figures indicate an unparalleled activity in railroad construction, with every prospect of its continuance for an indefinite period in the future, and at a more rapid rate per annum than during the past year, until all the waste places of the continent are supplied with facilities for transportation to the utmost limit of human needs. The great productiveness of the country undoubtedly justifies the outlay in these enterprises of the vast capital indicated in the figures, although it should be borne in mind that the nominal cost of $25,000 a mile is a good deal more than the actual cash expended.

The reduction in freight charges as shown by a comparison of last year's rates with those of former years is very significant. In 1855 the charge of moving a ton of wheat from Chicago to New York, a distance of 960 miles, was $31.39, as against $7.51 in 1881. The cost of moving a ton of freight one mile has also been reduced in a similar ratio. The New York Central road, for example, reports the comparative cost per ton per mile in 1872, at 1.129 cents, as against .783 cent in 1881, and the same may be said with respect to other trunk lines, the reduction corresponding to the increase of tonnage, and the quantity transported making up for reduced rate of profit. Freight charges, the report says must always be in inverse ratio to distance, or a limit would soon be reached when the excessive cost would stop shipments. Prices must be so graduated as to allow a profit on both sides, and they always will be so graduated. There can be no monopoly in law so long as the construction of railroads is open to all, and their business competed for by rival lines which must always continue to be rivals.

[* The *Railroad Gazette* says that this estimate is excessive, and gives data showing that the number of persons employed in operating the railroads of the United States is less than 650,000, or an average of 6¼ persons per mile of track.]

Throttle-Valve Stories.

The following exciting story, which appeared in the Utica *Herald* of May 20, has been figuring quite extensively in the newspapers, including some of the railway journals:

"An engineer on a Boston, Hoosac Tunnel & Western train, by rare presence of mind, averted what would have been a terrible accident. Between Reynolds station and Mechanicsville is a deep cut. On one side is a bill of clay and on the other a deep ditch. The train was just entering the cut when the engineer discovered that the hill was moving, and that in a moment it would be down upon the cars, causing great damage and probably loss of life. He knew he could not stop in time to avert the accident, so he grasped the throttle with a strong hand, and pulled it wide open. The train sped with lightning-like rapidity, and it had barely cleared the cut when the earth fell with terrific force, covering the track 10 feet deep for a distance of 200 feet. Had the earth struck the train it would without doubt have been hurled down the embankment and the loss of life must have been great."

Upon which the London *Engineer* comments as follows:

"It is quite time this sort of thing was stopped. We have heard the same story with variations until it begins to cloy. In days long gone by it was a bridge: 'The engineer grasped the throttle lever with his sinewy hand as he felt the bridge sink beneath his feet. Another moment and all would have been lost. With one despairing thought of his happy home far distant, of his wife and innocent babes, he flung the throttle wide open. One agonized moment, the train leaped the chasm as the bridge thundered down the abyss, and he and his human freight in his charge were safe.' Train stopped, subscription for engineer, etc. Sometimes we find the engineer's wife and family in the train. After a time the bridge idea began to get worked out, then came the hand-car on the track, again 'the engineer grasped the throttle lever' and so on. The hand-car is dissipated in fragments. Now and then we find the hand-car mixed up with cattle, or horses, or petroleum, but the foundation idea is always the same, namely, that by putting on full steam an obstacle can be overcome in a moment; that a train can jump across a river or demolish an obstruction, and so on. The theory is a delusion from beginning to end. In the first place the throttle valve is always wide open when the locomotive is working—that is, if the engineer knows his business—and the valve gear is 'linked up' to give expansion. In the second place, even if this were not the case, there can no more be a sudden acceleration of velocity from one speed to another than there can be a sudden starting of a train at full speed out of a station. If the velocity of a train could be suddenly altered from 30 to 60 miles an hour, the effect on the passengers would be just the same as though the train they were in being at rest, another train running at 30 miles an hour had pitched into it behind. In fact, the throttle-valve story is very pretty and sensational, but it has not the least foundation in truth, and ought to be banished from literature. There are plenty of opportunities open in other directions to the man who will seek them. Carrying a cow about on a buffer beam is not bad, and is nearly new. A double-tooth imbedded in the smoke box door, leading to the discovery of a suicide fifty miles further down the line, sounds pretty well. Then we want to hear again of the fight on the foot-plate, in which the virtuous stoker overcomes the drunken engine-driver. In fact to a man with sufficient ingenuity there are many chances still open."

THE *American Machinist* refers to a certain stock company recently organized with a "million" capital, and says it is strongly suggestive of a transaction which took place some years ago in a country town, the inhabitants of which were anxious to gain the reputation of carrying on large business operations. A live-stock dealer sold a cat for $15,000—a *bona fide* transaction—and took in payment two squirrels valued at $7,500 each.

THE officers of the Railway Master Mechanics' Association, for the current year, are as follows: President, Reuben Wells, Louisville & Nashville; First Vice-President, James Sedgley, Lake Shore & Michigan Southern; Second Vice-President, Howard Fry, New York, West Shore & Buffalo; Secretary, J. H. Setchel, Kentucky Central; Treasurer, S. J. Hayes, Illinois Central.

IT is said that the new locomotive works at Garfield, Ohio, will be completed in three or four months. The buildings will cost $102,000, and their erection will be under the superintendence of Franklin D. Childs, now superintendent of the Hinkley Locomotive Works, Boston.

THE eastern division and branches of the Quebec Montreal, Ottawa & Occidental Railway are now operated as an independent road under the name of "North Shore Railway." Mr. Adolphus Davis has been appointed General Manager, and will also have charge of the locomotive and mechanical departments. He has long been connected with original road, has introduced many improvements in the rolling stock, and is well known as a skillful mechanical engineer.

Fast Freight Box Car—Richmond & Alleghany Railroad.

GENERAL DIMENSIONS.

Length, outside of end sills	33 ft. 0 in.
Width, outside of side sills	3 " 4½ "
Height, bottom of sill to top of plate	7 " 5¾ "

SIZE OF TIMBERS.

Outside sills, heart yel. pine	5 × 9 in.
Middle and intermediate sills, heart yel. pine	4 × 9 "
End sills, wh. oak	7½ × 9 "
Body bolsters, wh. oak	5 × 14 "
Tie bolsters, "	4 × 7½ "
Side plates, heart yel. pine	3 × 5¾ "
End plates " "	3 × 10½ "
Carlines, clear yel. pine	1¾ × 10½ "
Ridge pole " "	1¾ × 4 "
Purlins wh. oak	1¾ × 3 "
Door posts, heart yel. pine	4 × 3⅞ "
Corner posts " "	4 × 4 "
End and intermediate posts, heart yel. pine	3 × 4 "
Side and end braces " "	3 × 4 "
Side and end girths " "	3 × 4 "
Draft timbers, wh. oak	4 × 6 "
Platform timbers "	4 × 5¾ "
Platform end timber, wh. oak	7 × 8 "
Door stops "	2 × 2½ "
Cornice, clear yel. pine	1¼ × 5 "
Flooring " "	1¾ × 8 "
Door rails and stiles, wh. oak, 1⅛ × 6 and	1⅛ × 5 "
Door braces	1⅛ × 4 "
Distance between door posts	5 ft. 6 "
" " tie bolsters	6 " 0 "
" " outside and intermediate sills	18¼ "
" " middle sills	10 "
Distance from center of bolster to outside of end sill	5 " 9 "

CONSTRUCTION.

The long sills to be framed into end sills with 1½ in. double tenons; mortises 1½ in. deep. End sills secured to long sills by ¾ in. strap bolts; strap bolts secured to long sills by two ⅝ in. bolts. The four sills and two end girths gained on to posts and braces, and secured to crossing of each with 3 in. screws; also, to have a ⅝ rod from door posts through corner posts over girths, and ⅝ rod across each end of car, through posts and siding, and over girths. Side plates mortised at ends to receive end plates, which are to have double tenons. Inside of end plates grooved for a ⅝ rod connecting side plates; plate and side sills connected by six ⅝ rods on each side car, and two ⅝ rods through side plates across the car under wide carlines grooved to receive rods.

Draft and platform timbers to be rabbeted into bolster, and secured to sills with ¾ bolts, each bolt to have a check nut.

Body bolsters gained ¼ in. for sills, and secured to each with two ¾ bolts. Tie bolsters gained ¾ in. for sills, and secured to middle and intermediate sills with one ⅝ bolt to each, and to side sills by ⅝ rod connecting plate and sill.

All posts to be 6 ft. 3 in. from shoulder to shoulder, with tenons 1¼ × 4 × 1½ in. long. Door posts to be rabbeted on outside corners ⅞ × 1 in. to secure the ⅞ in. siding, said posts to project ⅞ in. over outside of sids sills to come flush with siding. Corner posts to be rabbeted 2 × 1 in. on inside corners to receive girth and lining. Braces, six on each side, and two at each end of car, extending from sills to plates.

Siding to be white pine ⅞ thick and 4 in. wide, tongued and grooved, with bead in center and on one edge. Inside lining same as siding. Flooring of yellow pine 1¾ by 8 or 10 in. wide, tongued and grooved and nailed with 20 d. nails. Cornice fastened to plates with ¼ in. bolts.

Roof, Empire Car Roofing Co.'s sheet metal roof of galvanized corrugated iron, with board covering. Running boards 18¼ in. wide, of yellow pine, 1 in. thick and 9 in. wide, with ¼ in. space between, and secured to saddles with 2 in. screws.

Truss-rods, two longitudinal, of 1⅛ round iron, 1¼ diameter at ends for screw-threads, and extending through end sills, over bolsters and under tie-bolsters. Also 1 two-in. rods passing through bolsters and over center sills, as shown, wrought iron plate ⅜ × 4 × 14 in. long on ends of bolsters.

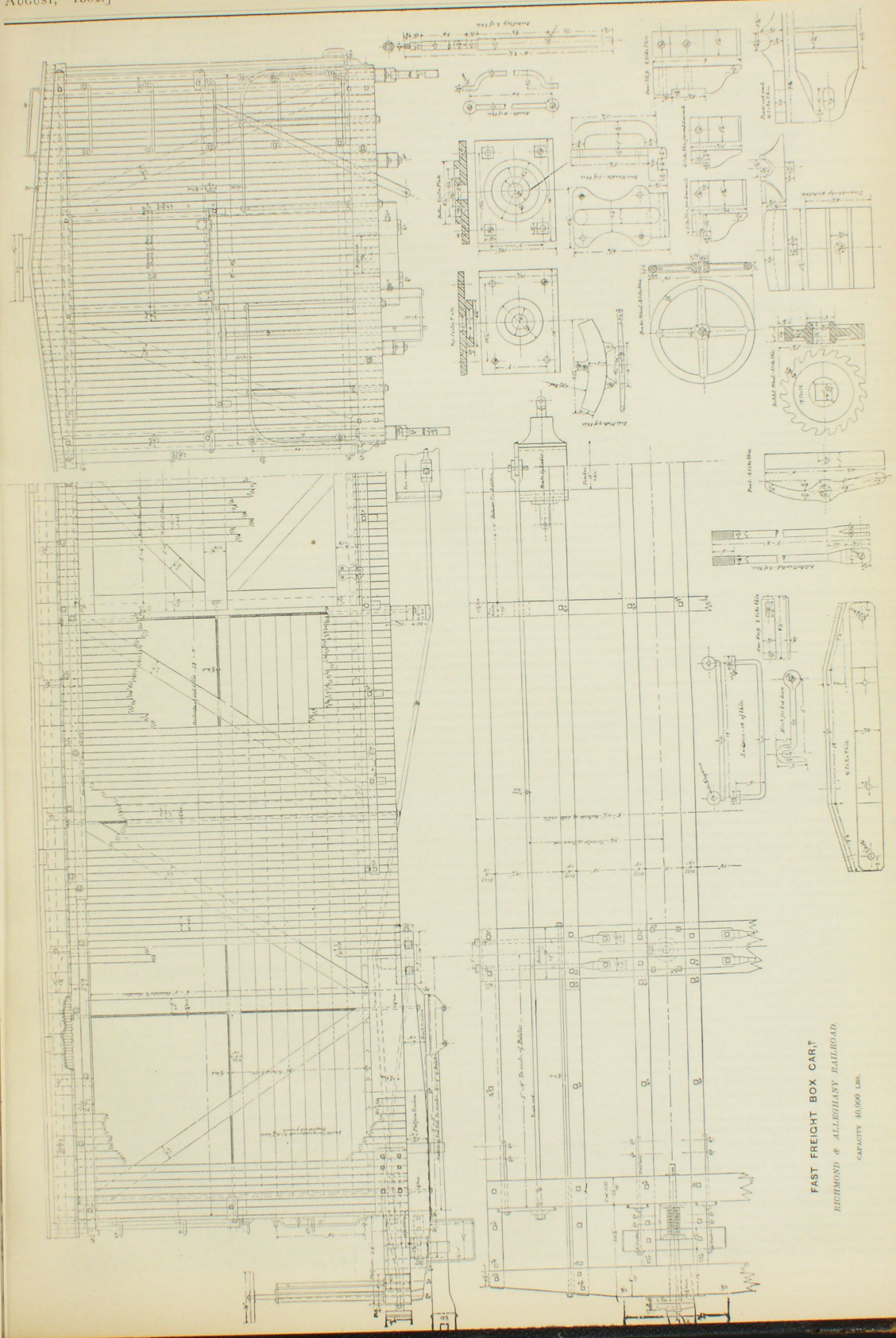
There are 4 handles on each end of car, and 1 handle on right-hand corner of roof over ladders; also 4 ladder-steps on right-hand corner of each end, and 4 steps 12 in. deep bolted to under side of side sills on each corner. On each bottom corner is a wrought iron plate ¼ × 9 in., extending 18 in. on side and 8 in. on end of car; also a corner plate about the middle of each corner post, and on each upper corner of car, to serve as washers. Eye-bolts, for safety chains, in side sills over each corner of truck.

Brake staff of 1⅛ in. round iron, enlarged to 1⅛ in. at lower end for chain, at each end of car. Brake wheel 14 in. diameter. An opening 24 in. wide in each end of car, extending from girth to end plates.

Miller platform to be 24 in. wide from outside of end timber, and supported by timbers bolted to under side of sills; flooring of platform to be yellow pine, 1 in. thick, 4½ in. wide, and with iron railing as shown. Trucks of the road's standard pattern, as illustrated in April CAR-BUILDER. In addition to the Miller platform and coupler, each car is to be equipped with the Westinghouse automatic air brake.

No cars have yet been built by the road in accordance with these specifications, but the details of their construction have been fully decided on.

THE suits pending in the United States Circuit Court in Portsmouth, N. H., to recover damages for the alleged infringement of the Tanner brake patent by the Concord & Claremont and the Boston, Concord & Montreal companies, have been dismissed in accordance with the decision of the Supreme Court of the United States in the similar suit against the Lake Shore & Michigan Southern.



FAST FREIGHT BOX CAR.†

RICHMOND & ALLEGHANY RAILROAD.

CAPACITY 40,000 LBS.

NATIONAL CAR BUILDER

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EDITORIAL ANNOUNCEMENTS.

Addresses.—*Business letters should be addressed, and drafts and money orders made payable, to* THE NATIONAL CAR-BUILDER. *Communications for the attention of the Editor should be addressed* EDITOR NATIONAL CAR-BUILDER.

Advertisements.—*Nothing will be inserted in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *The editorial department will contain our own views and opinions; and the rest of the reading matter, aside from advertisements, will be such as we consider of interest to our readers.*

Contributions.—*Articles relating to railway rolling stock construction and management, and kindred topics, by those who are practically acquainted with these subjects, are especially desired. Also early notice of changes in railroad officers, organizations and names of companies.*

Special Notice.—*As the* CAR-BUILDER *is printed and ready for mailing on the last day of the month, advertisements, correspondence, etc., intended for insertion, must be received not later than the 25th day of the month.*

SUBSCRIPTIONS *to the* CAR-BUILDER *will be received, and copies kept for sale, at the following places:*
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THE CAR-BUILDERS' ASSOCIATION AND ITS NEW DEPARTURE.

The new departure taken by the Car-Builders' Association, in becoming more of a representative body than it has been in the past, is expected to lead to results that will be highly beneficial to railroad interests in the economy of freight transportation. A glance at the committee reports and discussions at previous meetings will show that nine-tenths of what has been said and done has been in reference to this branch of traffic, and the saving that might be effected by the construction of better and more serviceable cars than are now in use. This probable saving has been roughly estimated at millions of dollars, and the desire to bring it about has been the chief incentive in giving a more pronounced representative character to the association. Railroad companies evidently do not, or at least have not hitherto, fully appreciated the advantages to accrue from the reform which it is proposed to carry out, or else they would have been the prime movers in its inception, instead of being dragged into it, so to speak, by persistent solicitation. The initiatory step, however, has been taken, but the final results will depend very largely, if not altogether, on the vigorous and earnest coöperation of the companies in the work that is to be done. It is one thing for this, that, or the other influential railroad manager to say what ought to be done; it is another thing for all of them to agree what to do, and still another thing to do it. As regards the functions of the Association itself, they will be in the future not essentially different from what they have been in the past. It will be an advisatory council whose business it will be to make recommendations based upon knowledge derived from investigation. This implies systematic work. There must be no tampering or temporizing, no putting off until to-morrow what should be done to-day.

There is great diversity in certain details of freight car construction, causing endless trouble in the interchanging and repairing of cars. To do away with this diversity by establishing well-matured standards for the different classes of cars that will be accepted and adhered to by the leading lines or systems of roads, is what must be done to save the "millions;" and if a million saved is as good as a million earned, every so-called railroad magnate ought to be able to see the point without much figuring. But the trouble is in dealing with the details. The practical part of the business is in determining what these standards shall be, embodying their details in drawings and specifications, and in selecting from the numerous patented devices those that are the most worthy of being adopted. Is this to be done by committees, or by the association itself, or by some one or more persons designated for the purpose and possessing superior and exceptional qualifications? How is it to be known what particular kind of truck, draw-bar, brake or brake shoe, is the best, and how is a choice to be made between evenly balanced alternatives—single or double buffer-blocks, for example—so as to meet general approval? We have no desire to magnify difficulties that are sufficiently formidable without being overcolored; but would merely suggest that the great end aimed at is not necessarily placed within easy reach by giving to the association a more strictly representative character. The next two or three years are quite likely to bring the trying ordeal of its existence, by showing to what extent, as an organization, it can be made effective in bringing about the reforms indicated.

Some additional changes are needed in its constitution—perhaps it would be more to the point to say that its organic law needs a thorough overhauling in order to make the association a good working machine. More money is wanted, provided its expenditure can be judiciously directed. There are mooted mechanical problems—the coning of wheels, the comparative economy of large and small wheels, train resistance, etc., that can only be settled by a liberal use of money in the way of experimental tests and scientific investigation. And in this connection we will venture to suggest that a well-salaried secretary to the association would be a first-rate investment, and one that will be found absolutely necessary to give to the new organization its proper efficiency. The duties which will hereafter devolve upon this officer are likely to be much more arduous than they have been in the past, and such as to justify the employment of a thoroughly competent assistant who can give his whole time to the work. We suggest this as a matter worthy of consideration at the Niagara meeting in October.

CAR WHEELS.

We give elsewhere an abstract of the discussion at the Car-builder's Convention on the report of the committee on the subject of a standard wheel gauge. If what was said by each of the members were printed in full, it would embody little more that is really essential than what is contained in our abstract, while it would occupy considerably more space. It may be said by way of comment that the committee's report and the discussion, taken together, show that the question of wheel economy with respect to freight cars is in a very complicated and unsatisfactory condition, and that any effective and speedy remedy for existing evils can hardly be looked for. That the railway system of the country is bound to outgrow this state of things is as certain as fate; but like every kind of growth that is worth much, it will be slow. The trouble is all summed up in that hackneyed phrase, "lack of uniformity." And there is no getting rid of the phrase. It will torment the next generation of railroad men in all probability as much, or nearly as much, as it does those now on the stage. The railroad system, in the matter of construction and equipment, is made up of parts that must sustain an orderly relation each to the other, beginning at the foundation and embracing the entire superstructure so to speak. The rails may be considered the foundation, although they are not strictly so. Uniformity must begin here if we would avoid the evils of diversity in the structures that are built to run on them. But is there any thing more than a kind of rude approximation to it, either in the sectional form of the rails, or in the distance they are placed apart? It is commonly understood that all the roads north of the Potomac and Ohio rivers have a uniform track gauge of 4-8½. But this is not so. The main line of the Pennsylvania road, and several of its connections, are gauged at 4-9, and this variation of half an inch from what should be the standard, is the source of the trouble the committee had to contend with in their attempts to prescribe a fixed and certain wheel gauge for an unfixed and uncertain gauge of track. The foundation, in other words, don't fit the superstructure so far as it consists of foreign or interchange cars, or, as the Pennsylvania people would put it, the superstructure don't fit the foundation. Then, as respects track gauge, there is another trouble which threatens the accuracy, or rather uniformity, of the prevailing standard. Some of the rails in use have the sides of their tops sloped at a considerable angle, and the gauge is measured sometimes from the top of the slope, sometimes from the bottom, and in order to diversify the diversity, sometimes from the middle.

Assuming the possibility of a perfectly uniform guage of track and form of rail, it may be pertinent to inquire whether a like uniformity in reference to the form of wheel flanges, width of tread, and amount of coning, is within the range of possibilities; also a precise knowledge of the effects resulting from the use of unbalanced wheels, and wheels "out of round." These points were incidentally discussed in connection with the subject of a standard wheel guage, but not in a way that indicated any definite conclusions. The wheel makers profess a willingness to co-operate in any movement consistent with their respective interests as competing manufacturers, to bring about something like uniformity in the forms and proportions of treads and flanges, and in the circumference of wheels. But as it is their business, more strictly speaking, to make such wheels as may be ordered, it remains for the car-builders and road managers to determine what is wanted. With them rests the responsibility, and until there is some effective co-operation and unity of action on the part of the roads in this matter, the reform so much desired will drag slowly. The wheel makers can afford to wait for the roads, although a less variety of forms and patterns would greatly simplify their work. They are sure of the business, and know very well that car-wheels are not going out of date this year nor next, but on the contrary, quite otherwise. It is to be hoped that the Car-Builders' Association, in its new representative capacity, will prove an efficient instrument in checking these evils, if they cannot be cured altogether.

The most prolific theme of discussion in connection with car wheels is the comparative advantages of coned and straight treads. Although the committee was instructed to report whether coning was advisable, and to what extent, the subject was very judiciously ignored in the report. There was quite an animated discussion about it, however, which had to be checked in order to give due attention to the main question. We only allude to it as illustrating the curious fact that after forty years of railroad operation, and the wearing out of millions of wheels upon tracks abounding in all sorts of curves, the comparative utility of coned and unconed wheels still remains an open question. Engineering experts and car-builders of experience and capacity entertain directly opposite views about it, which is perhaps pretty good evidence that the question is really not a very important one. The relation of the treads and flanges of wheels to the rail, and how and where the slipping occurs, can certainly be observed and noted with accuracy in the case of a truck pushed or pulled slowly round a curve; but at the ordinary speed of freight trains such observation is impracticable, and still more so with fast running passenger trains. Perhaps the instantaneous photographing process may be brought to bear upon these moving wheels one of these days, and throw some additional light on the problem. If the mule that had his head blown off with dynamite while standing on his feet could be photographed perfectly after the explosion and before he missed his head, something might be done with wheels moving on curves.

There is one argument that we do not remember to have heard in behalf of straight treads, which is this: Great stress is laid on the importance of having the wheels on the same axle of exactly the same circumference, so that at each revolution they will travel the same distance on the track. If it is true, as alleged, that coned wheels, after leaving a curve and entering on a straight track, oscilate from side to side, running alternately on the larger and smaller diameters of the tread, then in such case the advantage of having the two wheels of precisely the same circumference would be lost to some extent, at least, by the coning; while if the treads were straight the advantage would remain. We believe that on roads where the prevailing curves are of large radius, the advantages to be derived from wheels with straight treads would a great deal more than offset the benefits derived from coning. We know that in saying this much we are meddling with a subject which, from an engineering point of view, we are entirely incompetent to handle, yet we must confess to a kind of lurking sympathy with Mr. Garey in his opinion that "the coning of wheels is an old fogy notion that ought to be abandoned."

CENTRAL-SUPPORT FREIGHT CAR TRUCK.

During the past year an occasional paragraph has appeared in the railway and mechanical journals about a three-truck freight car, or, more properly, a freight car with a central supporting truck to sustain the weight of the load midway between the usual end trucks. It is obvious at a glance that this plan, if it can be made practicable, will enable a car to carry a much heavier load in proportion to its weight than it can with only two trucks. There are also other important advantages. The material that is put into a car body having only two end supports, must have a strength proportioned to the distance from one support to the other, in order to resist the breaking strain. The strength of a bridge between supports must be increased as the square of the span, the material in a 20-foot span requiring to be only a quarter as strong as in a 40-foot span. A car body is similar to a bridge. If the long span between the two trucks can be reduced to two spans by means of a central or intermediate truck, it is clear that the body can be made much lighter and still carry the same or even a greater load; and if the central support is a 4-wheel truck, the entire weight of car body and load is in such case distributed upon 12 instead of 8 journals, thus diminishing to that extent the liability of the journals to heat. The great

difficulty would seem to be to connect the middle truck with the car body in such a way as to allow of a lateral movement in curving. That such cars have been running very successfully for the past year on the Iron Mountain & Southern road, is beyond all question, as will appear from the following :

ST. LOUIS, June 2, 1882.

Central-Support Car-Truck Company, St. Louis, Mo.:

GENTLEMEN—In answer to your inquiry concerning the Terry Improved Truck now in use on this road, I have to say that since its adoption in June, 1880, it has been in common use. The cars to which it is attached have a carrying capacity of 48,000 lbs., the capacity of which without the truck was 22,000 lbs. The cars run smoothly and steadily, and take the severest curves without apparent friction. As these cars are in the ore and lumber trade, we run them with full loads. From the day we adopted the truck the cars have not been in the shop, and I do not see that they can need repairs until the parts are worn out. From my experience with and observation of this, I do not hesitate to recommend it to any railroad company as a useful and valuable invention.

O. A. HAYNES, Supt. of Machinery,
St. Louis, Iron Mountain & Southern Ry.

If there is no mistake about this, the Car-Builders' Association is indebted to the fortunate inventor. Mr. I. C. Terry, of St. Louis, for a solution of the problem they have been so long wrestling with: How to increase the carrying capacity of freight cars in such a way as to lessen the cost of transportation. We hope Mr. Terry's invention will have an early trial and a fair one on other roads.

FREIGHT CAR BUFFER-BLOCKS.

A casual observer who happens to notice the iron or wooden blocks on the ends of freight cars in a train made up of cars belonging to different roads, would hardly suspect that the sizes and positions of these simple attachments could occasion so much earnest and prolonged discussion, year after year, as they have done at the regular meetings of the Car-Builders' Association. Nor would it be suspected that the comparative utility of single and double blocks, the former being attached to the centers of the end-sills, and the latter placed at each side of the center, could divide the great mass of railroad men who are directly engaged in the building, repairing and running of freight cars, into two parties of such opposite views that they can only agree to disagree. Yet such is really the case; and it is a forcible illustration of the difficulties which lie in the way of arriving at any thing like approximate uniformity in respect to the drawing, buffing and coupling attachments of this class of cars.

These blocks are intended to protect the draw-bars and floor frame, and also to keep the cars a certain distance apart for the protection of the men who go between them; and if, as between the two systems of single and double blocks, there was no question except that of a little more or less of wear and tear, and economy in making repairs, the issue would not be a very important one, and each road or system of roads could adhere to its own peculiar notions with the hope that in due time other roads would adopt them and so put an end to diversity. If this were all, there would be little need of legislative interference. When such a large number of as thoroughly practical men as are the car-builders of the country are so equally divided in opinion about such a simple mechanical matter as the placing of one long wooden block or two shorter ones on the end of a car, it would be reasonable to assume that neither opinion could be very far wrong, and that things might safely be left to their natural drift. But unfortunately the lives and limbs of train men are involved, and the matter is beginning to attract the attention of the State Legislatures. These bodies may sooner or later feel impelled to decide whether single or double blocks shall be used. In doing so they would not be embarrassed by patents, which would be a great advantage in arriving at a decision. But being composed of men of various pursuits, they would probably seek information by reading the "block" discussion at the recent car-builders' convention, and after reading it would be as much perplexed what to do as was the mule standing midway between the two stacks of hay. Instead of being precipitate, they would probably hang fire, and wait a while longer for the railroad men to settle the point. We do not, in fact, believe there is any immediate danger of the passage of laws compelling the use of particular drawing, buffing and coupling devices on cars, for just as soon as the legislative Solons grapple with the subject and come to close quarters, they will recognize the propriety of dealing cautiously with matters they are not over familiar with, or of postponing action at least for the time being. The probability, however, of coercive legislation has had the effect of stimulating the car-builders, and although they have not been able to agree upon one uniform method, they have fixed the dimensions of single and double blocks so as to bring the two systems into such relations with each other that they will not interlock and dovetail together, the two double blocks being 8 inches square on their face and 12 inches apart, and the single block 28 inches long, or the same length as the double blocks are over all. This is settled at all events for the present, and it remains to be seen how far it will be conformed to by the roads.

In regard to automatic couplings and draw-bars, everything is chaos so far as standards are concerned. Mr. Garey says that none of the new devices are a sufficient improvement on the old link and pin system to justify their general use; and the *Scientific American* thinks that a patent for a successful coupler and draw-bar would be an exceedingly valuable property. Inventors, however, are a sanguine class of people not easily discouraged. If they were not, the coupler and draw-bar problems might be considered insoluble, and laid on the shelf with perpetual motion, Payne's water gas and Keely's motor. It seems to us that so far as car couplings are concerned, the labors of inventors would be more profitably directed if a line could be drawn between what is possible and attainable and what is not, and then let inventors in their efforts, and railroad men in their expectations, confine themselves to the practical side of the line. This would prevent many a disappointment, and might one of these days lead to the production of an automatic coupling device good enough to be a standard for all time.

THE freight handlers' strike in this city drags its slow length along, not exactly like the wounded snake in the poem, but with no very encouraging prospects ahead. Both sides have pluck and resources, but in the words of Lincoln, they cannot fight always. After great losses and much suffering, whichever side wins "the victory of endurance born," will find it to be substantially a barren victory. The issue will not be stamped out, but will be again precipitated under the same or similar conditions. The railroads terminating at a great commercial mart like New York can not afford anything like a permanent obstruction to the movement of freight, and still less can the shippers afford it; nor can the strikers, who are to a certain extent skilled laborers, afford to have their skill acquired by a host of common laborers, and so increase the competition in wages. Yet this is just what is now and has been going on. The railroads are gradually educating unskilled recruits to fill the temporary chasm caused by the strike, while the strikers are living upon contributions and relief funds, and comforting themselves with the reflection that for every dollar they lose by enforced idleness the railroads are losing ten dollars in other ways, and perhaps a good deal more. It is, as we have said, a question of resources. To analyze the issue and strike a balance between the right and wrong of it can not be done in a paragraph.

IT is no wonder that the outrageously attenuated legal names of some of our popular railway lines should breed a lot of nicknames, for short. Our people are good at this kind of thing. It is an inheritance that crops out in childhood. The age is too fast and practical, and the average duration of life is too short, to write and utter the names of the terminal and chief intermediate stations of a long road every time you have occasion to refer to that particular corporation. Nobody could "catch his train" half the time if he tried to do that. And so we have "Bee Line," "Pan Handle," "Nickel Plate," "Big Four," and many others of more strictly local repute. These, like all nicknames, are expressive and significant, as much so as "Big Six" was a few years ago in the city of New York, although in a different way. When these peculiar designations are not at hand, initials are resorted to; and of all vexatious things these are the most aggravating. They are bad enough when printed in clear type, but in scrawling, illegible manuscript, they are simply—well, it is impossible to do justice to the subject. We can think of no remedy but to invent more nicknames.

THE "hydro-carbon locomotive," with its 2,174 copper flues and a fire-chamber containing 352 burners, has been making a trial trip with a "full-fledged passenger train." Just how many cars a passenger train must have in order to be "full fledged" we can only conjecture, and so we will call it one car, and an empty one at that. Had there been more than one, and all of them loaded, it is difficult to understand why the facts should be withheld from the public. At all events, the train was hauled 19¾ miles on the Newark Branch of the Erie road. This will do for a start. The impending revolution in the motive power of the world, as announced a year ago, is doubtless now about to commence. It will be remembered that the fuel used is hydrogen gas, which is constantly reproduced by its own heat, filling the furnace and flues with a volume of flame so intense as to bear no comparison with any other kind of known calorific combustion, and producing steam at one-fifteenth the usual cost. It is, of course, easy to make fun of an undertaking in which the performance falls so prodigiously short of what was promised in the manifesto; yet there may be some practical outcome to the enterprise one of these days that will justify the claims made in its behalf and save it from utter failure.

MR. WEBB, the Chief Superintendent of Motive Power of the London & Northwestern Railway, has invented a compound locomotive, or a locomotive having a compound system of steam cylinders. Its purpose is to economize fuel by the use of high steam and high grades of expansion in the cylinders. It is described as having two sets of driving-wheels which are not connected, each set being driven by a separate set of pistons, or rather one low pressure piston of large size under the front end of the boiler for one set of drivers, and a pair of smaller ones outside, and about half way back, for the other set of drivers. The large piston is driven by steam exhausted from the small high pressure set, through a reheater in the smoke arch—a set of pipes just forward of the tubes. After this new locomotive had run about 6,000 miles in the Irish mail service, a report showed a respectable gain in economy of fuel, the average consumption per month, including the lighting of fires, being 28.2 lbs, of coal per train mile, as against the ordinary minimum of 30 lbs for doing the same work.

THE regular car manufacturers appear to be well supplied with orders, and a great many new cars are also under way in the road shops. These latter are mostly freight cars. The prospect of a dullness in this industry, which was apparent a few months ago, has ceased to excite uneasiness, in view of the big cereal crop that is maturing, and the possibilities of a car famine when the pressure comes for moving it. Passenger traffic also is likely to be well sustained. The summer excursion travel is enormous in the aggregate, and calls for a large equipment of cars to meet a constantly increasing demand. In the present development of the industrial and productive resources of the country, a collapse in car building would be an anomaly not easily accounted for.

Master Car-Painters' Association.

The following circular has been issued by Mr. D. D. Robertson, President of this Association :

"The thirteenth annual convention of the Master Car-Painters' Association of the United States and Canada will be held in Chicago, commencing on Wednesday, Sept. 20.

"The increasing interest in the Association has been very marked, and the object sought to be attained has been more fully accomplished during the past few years. The committee are now busy making the necessary arrangements, which, when completed, will be duly announced, and everything will be done to make the coming convention one of profit. Care has been taken in the selection of subjects for discussion, that they may be thoroughly practical, and in many cases touching difficulties which are of every day's occurrence in the paint shop. In addition to the subjects chosen, some portion of our time will be devoted to 'Plain Talk on General Topics,' giving an opportunity for any one to get the benefit of practical experience on any department of car painting on which he may desire information; any question or topic you may wish discussed, by forwarding the same to the Secretary, Mr. R. McKeon, New York, Pennsylvania & Ohio Railroad, Kent, Ohio, it will come under this head and receive due consideration.

"I would urge upon all master car-painters to endeavor to be present and take part in the convention. The meetings in the past have been of immense benefit, and nothing will be left undone to make the future still more interesting and instructive.

"The Secretary's circular will be issued at an early date, announcing the subjects for consideration and also the head-quarters for meetings."

Master Car-Builders' October Meeting.

June 20, 1882.

The committee appointed at the last meeting of the Master Car-Builders' Association to propose subjects for investigation and to be discussed at the adjourned meeting to be held in October, request members and others to suggest topics which they may think require investigation, and the discussion of which would be profitable to the members of the association or to the railroad companies. As it is desirable that the subjects which will be brought before the next meeting should be submitted to the consideration of proper committees as early as possible, an immediate reply to the circular is requested. The replies should be addressed to M. N. Forney, 73 Broadway, New York.

THOS. A. BISSELL,
L. PACKARD,
M. N. FORNEY, } *Committee.*

WE print, as a part of the proceedings of the Master Mechanics' Association, an interesting letter of Mr. P. H. Dudley on train resistance, and in connection therewith would call attention to the views of a contributor on the same subject.

L. G. TILLOTSON & CO., of New York, dealers in railway equipment and supplies, have issued a finely illustrated catalogue of 326 pages, containing a comprehensive list of goods in their line, and which will be found very convenient for purchasers.

OUR last issue contained a notice of some new passenger cars built by Bowers, Dure & Co., for the Lehigh Valley Railroad, in which it was stated that the seats and seat backs were of the Hale & Kilburn patent. Mr. Chas. C. Mason, of Altoona, informs us that the seats and backs are his patent, but are fitted up with the Hale & Kilburn patent flexible top springs.

THE Tanite Co., of Stroudsburg, Pa., has recently received a foreign order for a solid emory wheel 36 inches in diameter and 8 inches in thickness. The wheel weighs about 800 pounds, and its list price is $500. The company is now building a special machine on which to run the wheel, the machine being of an entirely new design and weighing 2,200 pounds. An additional foreign order has been received by the company for $3,000 worth of solid emery wheels, and notwithstanding the recent enlargement of its works, they are busier than ever.

THE Halladay patent automatic saw-sharpener for circular saws, manufactured by Halladay, Litchfield & Co., of Chicago, is said to be the most perfect machine of the kind ever offered to the public. It is adapted to saws from 12 inches to 6 feet in diameter, and of any thickness. The feed mechanism is under the control of the operator at all times and can be changed without stopping the machine. Any shape of tooth can be made by a slight change in the cam, and the throat of tooth can be enlarged simply by giving more or less lead to the cam. It can be thrown out of gear while setting the feed and adjusting the saw to the emery wheel. Saws kept in order on one of these machines require no gumming, no jointing and no filing. It will feed from 11 to 16 teeth per minute. Price delivered on cars, $160.

The Machinery Situation.

A few weeks ago the press of orders for machinery and tools was declining, and many of the manufacturers were apprehensive of actual dullness before the opening of full trade in other branches of business. Those who had steadily been refusing orders were many of them willing to reopen correspondence with prospective purchasers, and in some cases extreme prices were moderately shaded to secure a few desirable customers. The past three weeks have shown a decided change in the situation. Purchasers who were awaiting events are becoming anxious, and are hastening to place their orders for fulfillment at the earliest practicable moment. Reports that reach us from different quarters, both East and West, as well as our own observations among the shops, agree that a renewed activity has sprung up this month, which was hardly to have been expected in midsummer. If we look for causes, we can, perhaps, discover nothing more potent in bringing about this accelerated movement than the prospect of bountiful crops, especially of breadstuffs, which are likely to be in good demand abroad. The activity in railroad building and equipment will be greatly strengthened by the now almost certain prospect of good crops; and upon the railroad industry, more than any other single business, depends the demand for machinery and tools. No more rapid progress in railroad construction could be desired than already exists. All that is needed to sustain and push forward the work on so large a scale is a reasonable assurance that enough transportation business can be obtained to make both new and old lines pay expenses. Profits are usually left to the developments of the future. Several railroad enterprises are undoubtedly in advance of public requirements, but the rapid growth of the country—more rapid than ever before—will in time render some lines valuable that are now unnecessary. Locomotive building has not experienced any such check as was reported in daily papers a few weeks ago, and is not likely to be retarded for months to come.—*American Machinist.*

THE Suspension Car Truck Manufacturing Company of New York has decided to locate at Pullman, where a tract of land comprising 20 acres, just north of the Pullman car shops, has been secured. Pending the completion of the large and extensive shops a portion of the Pullman car shops will be temporarily used for the manufacture of the car trucks, as it has been found advisable to commence operations at once.

Revelations of a Railroad Dead Beat.

A correspondent of the New York *Sun* says that a match has been made up between two experts in railroad deadheading, to determine which will travel from Harrisburg, Pa., to a certain city (not named) west of the Mississippi River, and get through the quickest inside of seven days, the wager being $100, to be paid to the winner. The contestants are to travel without any money whatever. One of them, who claims to have had the most experience in this line of business, gives away train conductors, brakemen and others in this fashion. He says:

"Conductors on through express trains are generally good men, especially out West. Why, sir, a many time I've gone square up to one of them before the train started, and spoke right out in a manly way, about in this fashion: 'Boss, I'm dead broke; not a penny in the world, and I'm hungry. Can't you carry me a few hundred miles? I want to get home.' Well, sir, those up-and-up, fat and jolly fellows always had a kind word, but I won't give 'em away. I won't say what they told me to do and how to do it; but nine cases out of ten I got to where I wanted to go, as free as the best Congressman in the world. Oh, yes, I've travelled on a palace car in the daytime, but not at night. A free traveler don't take to sleeping coaches. I just got on to a palace car a few times, just to say that I'd been there and had taken all of it in. I've made trips on engines, tenders, palace and passenger coaches, freight cars, oil tanks, gondolas, wheat cars, cattle trains, coal cars, flat cars, and every other kind of cars, but believe me or not, I most enjoy a pipe with a good man on the 'hind end of a freight train on a pleasant summer night. I tell you, sir, it beats all high-toned travel. The yarns that can be spun and the experience meetings of railroaders and tramps would make an interesting book. I can talk railroading to the best of 'em. They don't know but what I'm one myself; and they don't know how soon they'll take a free trip themselves.

"Living on the road is the hardest thing about it. If a man is dead broke he finds it pretty tough. If he wants to make time, however, in a race he mustn't look for his three square meals a day. I made a 1,500-mile trip once in a very short time; only laid off one-half hour. I was going through on a passenger train and when I had got over about 500 miles I saw an old woman get out of the car with a heavy valise. I asked her to allow me to carry it for her to her home. She said I might. Going along I told her my story. She gave me fifty cents and tied up enough bread and cold ham to last me three days. I hurried back to the depot, got on the same train and went on happy as a clam. I bought a twenty-five-cent cigar and gave it to the conductor. He'll never forget me as long as he lives, or that cigar. It was probably the best one he ever smoked in his life. He finished it in the baggage car and at the end of the section he passed me over to another conductor, a friend of his, who chalked my hat as far as he went. One time I caught a little boy just as he fell between the bumpers while the train was going forty miles an hour. His father saw me raise up the kid safe and sound. That was on the Louisville & Nashville road. I got a new twenty-dollar bill for that job, and you can bet your very life that me and all the brakemen along the line clear to Mobile and New Orleans had a picnic in a quiet way that we'll never forget. Why, sir, we had fruit, sandwiches, cold chicken, pie, lemonade, porter in bottles, sardines, cigars, hot coffee and the best tobacco to be had for money. It wouldn't be a hard matter for me to make a flying trip over that route, would it? It wouldn't cost me a cent, would it? Certainly not. Them men's white and they've got good memories, every one of 'em.

"A man who ain't clean looking can never get ahead very good. Water is plenty and soap is cheap. Any man who wants to take a decent wash can always find a washroom at a depot if he's smart. Do you know that there's not a question that I know of that goes so deep as when you ask a stranger to help you to get a place where you can wash yourself? Why, sir, no man will refuse, if he's got a heart as small as a lemon seed. That question's made me more friends than any other I ever asked. It shows up the gentleman, you know, and that's what wins every time. Nothing like being gentle, quiet and shy. If you're loud-mouthed and bullyish you'll put your foot in it every time, and it 'll stick there, too. That question not only brings plenty of soap and water and a towel, but it brings something to eat and a place to sleep. One time it brought me a whole suit and a boiled shirt. But I never asked for anything more than a place to take a wash. The first time I got on to that racket I asked a square-looking man in Tennessee to show me to a stream of water where I could get a wash. Mind you, it was winter, and he knew I didn't want to swim. He eyed me a minute or two, and said if I didn't get out he'd break my neck. Said he, 'See here, young fellow, that's a weak hand you're playing. Why don't you come right out and ask for a basin of water and a piece of soap? Beating around the bush your way is too thin. It won't wash, and neither will you. What do you expect to make by lying like that?' Now, the fact is I was not lying, but I saw how stupid my question was, and I made up my mind to take the man's advice. I told him so, too, and he's the fellow that gave me the suit of clothes. He keeps a wood yard in Louisville, and I'll never forget him.

"The only railroad pass that I ever asked for or refused was on the Texas Pacific road. I went into the office in Marshall and asked for a trip pass. 'What do you want with a pass?' said a gruff man. 'Well, sir,' said I, 'I want to go beyond Fort Worth to see how the land lays for hog raising.' The man laughed, looked at my seedy clothes and dark skin awhile, and then jumped up with a laugh and a sneer and said: 'By thunder, I will give you a pass! When you get to that hog country commence on yourself.' I took the pass, tore it up in front of his face, and told him I wouldn't think of going to any place where he had been raised. I never forgot or forgave that insult. I went out, and in a few hours I was riding on a passenger train to Fort Worth, under the protection of as good a conductor as ever punched a ticket. I did not like the country much, so I doubled the road next day, and a week afterward I was drinking beer in Milwaukee. You see, men out on the road go just where the spirit moves them. I was in Denver three years ago, and I picked up a newspaper containing an article descriptive of a Florida orange picking. I didn't believe the yarn, and I made up my mind to go and see for myself. In ten days I was on the ground personally, and I saw that what I had read was true as gospel. Florida is a poor country. Oranges retail for more than they cost in New York. I skipped out of the country mighty fast."

The Jaffa and Jerusalem Railroad.

A little double, iron track.
A station here, a station there,
A locomotive, tender, tank,
A coach with patent swinging chair;
A postal car and baggage, too,
A platform of the Miller make,
With buffer, draw-head, chain and spike,
And nobby automatic brake—
Such is the pride of orient hordes,
And Syria's brightest modern gem—
The railroad train that snails along
'Twixt Jaffa and Jerusalem.

Beware, O sacred Mooley cow,
The engine when it rings its bell!
Beware, O camel, when you hear
The whistle's sharp and warning swell!
And, native of the Holy Land,
Unused to modern travel's snare,
And soothed by guileful taffy talk,
The awful peanut boy beware!
Else, trusting to his words and wares,
Thou may'st have reason to condemn
The style of traffic that prevails
'Twixt Jaffa and Jerusalem!

And when, ah! when the bonds fall due,
How vexed and wroth will wax the State—
From Nebo's mount to Nazareth
The cry will sound, "Repudiate!"
From Hebron to Tiberias,
From Jordan's banks unto the sea,
Will swell the chorus, loud and long,
Against that "—— monopoly."
The horny-handed shepherd swain,
Oppressed by bonded stratagem,
Will curse that corporation line
'Twixt Jaffa and Jerusalem!

—*Denver Tribune.*

A Wyoming man saw a Texas steer standing on the railroad track, and knowing that the express train was due, he tried to induce the beast to move. Several pieces of board thrown at the ferocious monster failed to move him, until at last, as the train rushed down the track at lightning speed, he seized the steer by the tail and twisted it like a wet towel. At this moment the train struck them both, and the result was stupendous. The steer was found two days afterward browsing peacefully in a corn field with two driving wheel hung on its horns. No trace of either the man or the engine has been heard of since.—*Easy Liar.*

On a Kentucky railroad the other day an engineer discovered a man lying across the track asleep and with a big bottle in his pocket. The brave engineer climbed out on the pilot and snatched the bottle just in time to keep its contents from being spilled.

"What becomes of all the old box cars?" the visitor asked the master mechanic. "Oh, we paint 'em up, put handles on 'em and sell 'em for Saratoga trunks," was the reply.

Recent Reports of Railway Rolling Stock.

Cincinnati, Hamilton & Dayton.—86 engines; 61 passenger, 5 mail and 21 baggage cars; 1,226 box, 177 stock, 347 coal, 464 flat and 31 caboose cars; 6 wrecking cars.

Boston, Concord & Montreal.—23 engines; 26 passenger, 2 drawing room, 3 observation and 20 mail and baggage cars; 833 freight cars.

Baltimore & Potomac.—89 engines; 38 passenger, 1 combination and 21 baggage, mail and express cars; 1,924 box, 154 stock, 15 oil, 19 gondola, 471 flat and 50 caboose cars; 1 pay car, 1 tool, 2 derrick and 2 boarding cars. There are also 654 leased freight cars on the road.

Northern of New Hampshire.—23 engines; 12 passenger, 1 mail, 7 baggage, 2 mail and smoking, 411 freight and 18 gravel cars.

Wilmington & Northern.—15 engines; 6 passenger and 5 combination cars; 48 box, 6 line box, 1 stock, 62 gondola and 4 caboose cars; 8 service cars.

Southern Pacific.—48 engines; 76 passenger, 13 baggage, mail and express, 603 box, 350 flat, and 206 service cars.

Ogdensburg & Lake Champlain.—30 locomotives; 14 passenger, 6 baggage and smoking, 12 caboose, 481 long box, 751 short box, 38 stock, 39 butter and egg cars, 13 rack, 35 ore and 98 platform cars.

Indiana, Bloomington & Western.—112 engines; 79 passenger, 2 sleeping, 2 parlor, 4 chair and 41 baggage, mail and express cars; 1,701 box, 396 stock, 729 coal, 411 platform and 45 caboose cars; 216 service cars.

Chicago, Rock Island & Pacific.—206 engines; 117 passenger, 17 sleeping, 6 dining, 8 postal and 39 baggage, mail and express cars; 4,404 box, 1,083 stock, 1,825 flat and coal, and 187 caboose cars; 2 officers' and pay cars, and 666 service cars, including hand cars.

Montpelier & Wells River.—3 engines; 4 passenger, 1 combination and 2 baggage cars; 53 freight cars and 1 caboose; 1 derrick car and 1 snow plow.

Camden & Atlantic.—16 locomotives; 66 passenger, 5 parlor, 9 combination and 4 baggage cars; 61 box, 3 refrigerator, 22 flat and 56 gondola cars and 1 caboose car; 20 gravel, 13 lime and 6 timber truck cars; 1 derrick car.

Our Directory.

We note the following changes since our last issue. Readers are requested to give us prompt notice of changes when they occur:

Augusta & Knoxville.—A. J. Twiggs, Chief Engineer and Superintendent, has resigned his position, and taken the contract for grading the Savannah Railroad in South Carolina.

Boston, Revere Beach & Lynn.—Leonard C. Legro is appointed Superintendent, in place of Edwin C. Whorf, resigned. Mr. Legro has been for several years a Conductor on the road.

East Tennessee, Virginia & Georgia.—Mr. M. W. McCracken is appointed Superintendent of the Georgia Division, which will include the line from Ooltewah Junction, by Dalton, Rome, Atlanta and Macon, to Brunswick. His office is at Atlanta, Ga.

Indiana, Bloomington & Western.—D. W. C. Brown has resigned his position as Superintendent of the Ohio Division. He has been on the road eight years.

Kentucky Central.—The office of General Manager has been abolished. J. H. Setchel will have charge of all shops, maintenance of way and transportation, with title of Superintendent.

Marietta & Cincinnati.—Edward Evans, formerly general foreman, has been appointed Master Mechanic of the road, vice Mr. Bosley, deceased.

New York Central & Hudson River.—Amos Gould has been appointed Assistant Superintendent of Motive Power, a new office. He has been for a long time Master Mechanic of the Western Division.

New York, Ontario & Western.—Isaac W. Fowler has been appointed Purchasing Agent, in place of Charles Clark, resigned.

North Shore.—This is the name of what was heretofore the Western Division of the Quebec, Montreal, Ottawa and Occidental road.

Northern Pacific.—W. J. Brokaw has been appointed Master Mechanic of the entire Construction Department of the Eastern Division of this road, with office at Forsythe, Montana.

Ontario Southern.—S. B. Stuart is appointed Superintendent, in place of E. R. Mills, resigned.

Portland & Rochester.—J. W. Peters has been appointed Superintendent. He will also continue to perform the duties of General Ticket Agent.

St. Louis, Iron Mountain & Southern.—Wm. Kerrigan has been appointed Superintendent, in place of Mr. E. L. Dudley, transferred to the Texas & Pacific.

Texas & Pacific.—E. L. Dudley is appointed Superintendent, in place of E. S. Sands, resigned. He has been for some years connected with the Iron Mountain road.

Texas Mexican.—P. J. Milan has been appointed Master Mechanic, with office at Corpus Christi, Tex. J. T. Odell has resigned the position of General Superintendent.

Employment.

Advertisements will be inserted under this heading for one dollar for each insertion.

WANTED.—Capital to extend the introduction of a device which is already in operation and is now saving 26 per cent. in the running expenses of locomotives. Address "RICHELIEU," care NATIONAL CAR-BUILDER, Morse Building, New York.

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MANUFACTURERS OF

RAILWAY CAR AND FINE COACH VARNISHES.

Cor. West and West 12th sts., New York.

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MAKERS OF STRICTLY FIRST-CLASS

Railway Varnishes,

AND MANUFACTURERS OF

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By permission, we refer to the following Companies, for whom we have made Special Colors:

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PENNSYLVANIA CO., Wm. Mullins, General Purchasing Agent, Pittsburg, Pa.
BALTIMORE & OHIO RAILROAD CO., N. S. Hill, Purchasing Agent, Baltimore Md.
CHICAGO & ALTON RAILROAD CO., A. V. Hartwell, Purchasing Agent, Chicago, Ill.
CHICAGO & NORTHWESTERN RAILROAD CO., R. W. Hamer, Purchasing Agent, Chicago, Ill.
LEHIGH VALLEY RAILROAD CO., L. Chamberlin, Purchasing Agent, Philadelphia, Pa.
NORTHERN RAILROAD OF CANADA, F. W. Cumberland, Superintendent, Toronto, Ont.
NAUGATUCK RAILROAD CO., G. W. Beach, Superintendent, Waterbury, Conn.
PHILADELPHIA, WILMINGTON & BALTIMORE RAILROAD CO., S. A. Hodgman, Superintendent of Motive Power, Wilmington, Del.
NEW YORK, NEW HAVEN & HARTFORD RAILROAD CO., R. N Dowd, Commissary, New Haven, Conn.
UNION PACIFIC RAILROAD CO., } A. D. Clark, Purchasing Agent, Omaha, Neb.
KANSAS " " "
CHICAGO, BURLINGTON & QUINCY RAILROAD CO., Wm. Irving, Purchasing Agent Chicago, Ill.
LOUISVILLE, CINCINNATI & LEXINGTON RAILROAD CO., Wm. Mahl, Purchasing Agent, Louisville, Ky
GRAND TRUNK RAILWAY N. Wall, Port Huron, Mich.
LITTLE ROCK & FORT SMITH RAILROAD CO., T. Hartman, Purchasing Agent, Little Rock, Ark.
GILBERT & BUSH CO., Troy, N. Y.
WASON MANUFACTURING CO., Brightwood, Mass.
BILLMEYER & SMALL MANUFACTURING CO., York, Pa. } Railroad Car Builders.
JACKSON & SHARP CO., Wilmington, Del.
BARNEY & SMITH MANUFACTURING CO., Dayton, O.

The advantages derived from the use of such Special Colors are many, a few of which are found below:
ABSOLUTE UNIFORMITY OF SHADE. DURABILITY, as we use perfectly pure materials. **SAVING OF MONEY,** because of small quantity required. **SAVING OF TIME,** in the putting on of the same. **SAVING OF LABOR AND MATERIAL,** as no extra amount of Varnish will be required to hide a sanded surface. **LARGER DEGREE OF CERTAINTY** that there will be an absence of cracked work, as our mixtures are all uniform, being done by weight only.

We make any desired shade, it only being necessary that purchasers furnish us with sample of color desired, stating the time they would like to have the paint dry in.

We shall be glad to furnish samples and give prices to any who may wish to avail themselves of the above advantages.

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Examination of Railroad Properties and Accounts, detailed Reports prepared of their condition and future prospects,

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Construction of Railroads, the Purchase, Sale and Inspection of R. R. Material and Equipment.

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REFERENCES:

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H. W. Ford, Pres. Nat'l Bank of Republic, N. Y.
R. T. Wilson & Co., Bankers, N. Y.
J. M. Crane, Cashier Nat'l Shoe & Leather Bank, N. Y.
Owens & Mercer, Bankers, N. Y.
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H. B. Plant, Pres't Savannah, Florida & Western R. R., and Southern Express Co., N. Y.
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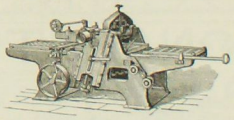

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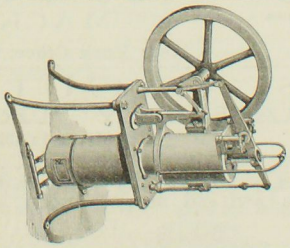

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For Tank Pumping for Houses and Country Seats, Hotels, &c., in City and Country.

OVER 4,000 IN USE.

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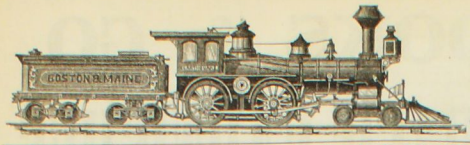

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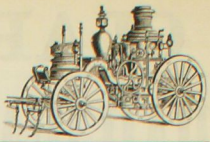

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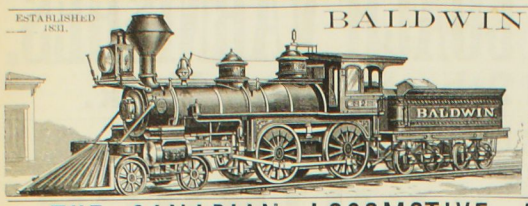

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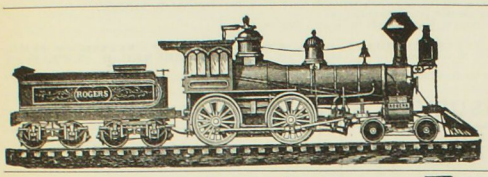

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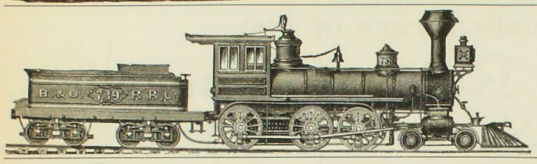

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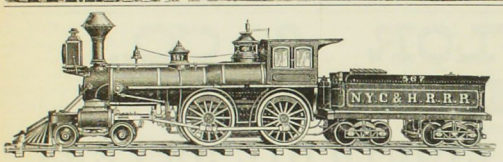

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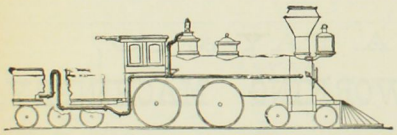

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The Ashton Blow-back Safety-valve is constructed so as to conduct the escape steam which is blown off back to the tender, or to the smoke-box and up the chimney. By this arrangement the heat of the escape steam, instead of being wasted as it is when an ordinary safety-valve blows off, is communicated to the cold water in the tender. This not only results in an important economy, but it renders the escaping steam noiseless, and the increase of temperature of the water has a tendency to deposit some of its impurities before it is pumped into the boiler. It thus *stops the noise, saves fuel, and all engines steam better and faster, and do more effective work with these valves* than with those in ordinary use.

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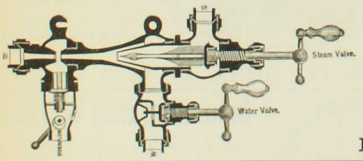

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Special Semi-Steel Tubes for Locomotives, Extra Heavy and Double Durability.
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EAMES VACUUM BRAKE CO.,
RAILWAY TRAIN BRAKES,
P. O. Box 2878. SALES OFFICE, 15 GOLD ST., NEW YORK. Represented by THOMAS PROSSER & SON.
THE EAMES VACUUM BRAKE is confidently offered as the most efficient, simple, durable, and cheapest power Brake in the market. Can be seen in operation upon over seventy roads.

HALE & KILBURN MANUFACTURING COMP'Y
48 AND 50 NORTH SIXTH STREET, PHILADELPHIA, PA.,

ELASTIC SLAT SEAT.

REFERENCES.
N. Y. C. & H. R. R. CO.
N. Y. ELEVATED R. R.
ILL. CENTRAL R. R.
PULLMAN P. C. CO.
PENN. R. R. CO.
N. Y. & N. ENG'D R. R.
BALT. & O. R. R.
AND ONE HUNDRED OTHERS.

RATTAN SPRING SEAT.

EXTENSIVE MAKERS OF
PATENTED CAR SEATS
AND
SPRINGS.

SPRING EDGE SEAT.

ESTIMATES, CIRCULARS AND SAMPLES FURNISHED ON APPLICATION.

PARLOR CAR CHAIR

BACKUS

DARK LOCOMOTIVE

OIL,

BEING 24° SPECIFIC GRAVITY, IS AS THICK AND HEAVY AS CASTOR OIL, AND IS JUST THE OIL FOR A LOCOMOTIVE, OR ANY PLACE WHERE AN

Extraordinary Heavy Oil is Needed.

H. M. BACKUS, Gen. Manager. F. B. HOWEP, Supt. Sales Dept. D. H. WILSON, Treas.

NIAGARA REFINING CO. H. M. BACKUS GEN'L MANAGER.

BACKUS

PALMETTO

CAR GREASE,

IS NOT AFFECTED BY CLIMATIC CHANGES. IT OVERCOMES FRICTION, PREVENTS HOT BOXES, AND IS A PERFECT LUBRICATOR.

BUFFALO.

JAMES W. ROSS,

IMPORTER OF AND FURNACE AGENT FOR

SCOTCH and AMERICAN PIG IRON,

MANUFACTURERS' AGENT OF

Bar Iron, Car Wheels, Axles, Rails and Railroad Supplies.

SALES AGENT

WHITAKER IRON CO., of Wheeling, W. Va.

Manufacturers of Sheet-Iron, Tank, and Fire Bed.

36 Dearborn Street, - - - - CHICAGO.

A. A. THOMSON & CO.,

IMPORTERS AND DEALERS IN

Genuine Russia Sheet Iron.

THE BEST FOR LOCOMOTIVE JACKETS.

Tin and Roofing Plates especially adapted for Railroad Car Roofs, Pig Tin, Zinc, Solder, Lead, etc.

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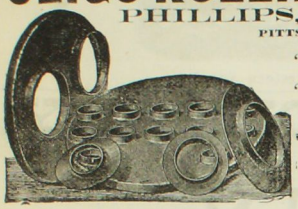
SLIGO ROLLING MILLS.

PHILLIPS, NIMICK & CO.,

PITTSBURGH, PA.,

MANUFACTURERS OF



"Sligo" Boiler Plate and Fire-Box Iron.

"Sligo" Bar, Band, Sheet and Angle Iron.

"Sligo" Stay Bolt Iron, Used by the Principal Railroads in the United States, and Warranted Unexcelled.

"TYRONE" BRAND BAR SHEET, TANK PLATE and ANGLE IRON.

Quality our Specialty.

BOILER HEADS AND FLUE HOLES FLANGED TO ORDER.

SEND FOR PRICE-LIST.

STEWART & LAWSON,

186 West Second Street, Cincinnati, O.

RAILROAD SUPPLIES, CONTRACTORS' SUPPLIES, MACHINISTS' SUPPLIES, AND STEEL.

Polished Compressed Steel Shafting and Piston Rods.

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MANUFACTURERS

MACHINE TOOLS AND TWEDDLE'S HYDRAULIC RIVETER.

THE 1876 INJECTOR BOILER-FEEDER,

SIMPLE, RELIABLE AND EFFECTIVE.

Started, Regulated and Stopped by one Motion of a Lever.

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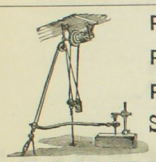

PORTABLE Machines for Use by Bridge, Engine and Boiler Makers.

PORTABLE Drilling, Tapping, Boring, and Reaming Machines

PORTABLE Machines for Wood Boring, Polishing, and Emery Wheel Grinding.

STOW FLEXIBLE SHAFT Co., Limited,

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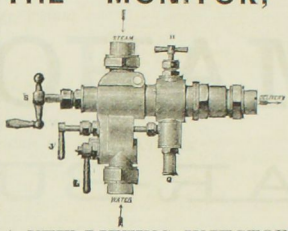
THE "MONITOR," FRIEDMANN'S PATENT



A NEW LIFTING INJECTOR FOR LOCOMOTIVES.

Locomotive Injectors

LIFTING & NON-LIFTING

With all Latest Improvements.

EJECTORS, OILERS, LUBRICATORS, &c.

NATHAN & DREYFUS,

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Send for Descriptive Circular.

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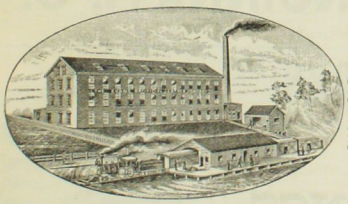
RAILWAY, MILL, MINE AND MACHINISTS' SUPPLIES AND TOOLS,

No. 137 FIRST AVENUE, PITTSBURGH, PA.

ECONOMY AND BEAUTY COMBINED IN THE

EVANS ARTIFICIAL LEATHER.



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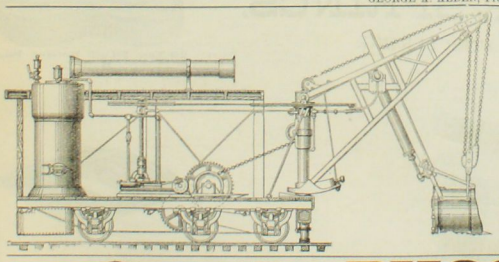
This is the only substitute for UPPER LEATHER in the world that has PROVED SATISFACTORY OR PRACTICAL, and that cannot be distinguished from leather. Being very handsome and durable, not affected by heat or cold, and impervious to oil or water, it is for many purposes superior to leather, and costs from 33 to 50 per cent. less. It is manufactured in various weights and in every desirable shade of color, including also gold, silver and bronze. It comes in rolls of 30 and 50 yards, and 36 and 50 inches in width. A corporation has recently been organized under the laws of New Hampshire—where the factory is located—for the manufacture of this Artificial Leather, under various letters patent granted by the United States. A full assortment of the above most desirable goods can be found and articles made from it shown, at office and salesrooms, 92 Pearl street, corner of High street, Boston, Mass. Send for price list to the

Evans Artificial Leather Company.

GEORGE A. ALDEN, President. H. S. CHASE, Treasurer. WALTER N. DOLE, General Agent.



DILL'S IMPROVED IRON RAILROAD

STEAM SHOVEL & DERRICK CAR,

PATENTED 1880 AND 1881,

for loading ballast, moving heavy weights and clearing wrecks. Will do more work with less labor than any other Excavator. Crane and dipper operated by direct steam. Expense of chain and gearing avoided. The dipper is easily detached, leaving the machine a most simple, strong and effective derrick. Self-propelling on standard gauge; requires only 15 feet head room; will lift 18 feet and swing 20 feet from centre of track. Weight about 30 tons. We have standard sizes on hand, and make any special sizes to order.

INDUSTRIAL WORKS.

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PHOSPHOR-BRONZE,

FOR BEARINGS OF LOCOMOTIVES, CARS AND MACHINERY

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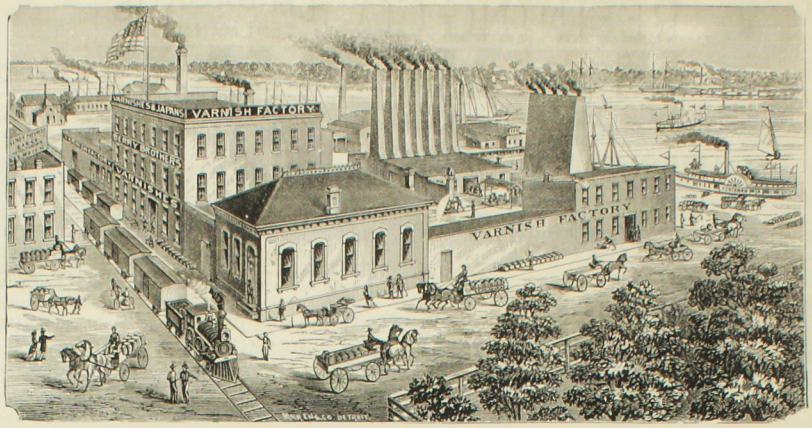
BERRY BROTHERS, DETROIT, MICH., MANUFACTURERS OF RAILWAY VARNISHES.

ESTABLISHED IN 1858.
USE BERRY BROTHERS'
RAILWAY VARNISHES.

Frontage on Wight Street, 218 ft.



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Via New Orleans,

MANUFACTURED TO SIZES SPECIALLY ADAPTED FOR

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VENEERS, CAR-BUILDERS' MATERIAL

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Estimates and Price Lists Furnished.

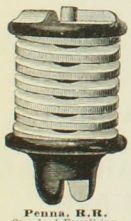
KEYSTONE CAR SPRING WORKS.

CHARLES SCOTT,

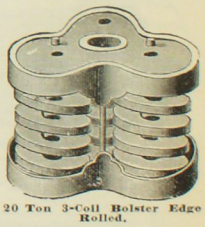
C. T. SCHOEN, Supt. MANUFACTURER OF

RAILWAY CAR SPRINGS.

KEYSTONE SINGLE COIL BOLSTER SPRING.

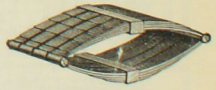


Penna. R.R.
Standard Equalizing.



20 Ton 3-Coil Bolster Edge Rolled.

NO. 19.



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Capacity, 35,000 Pounds Each.

Motion Very Soft and Slow.

1,028 TO 1,038 NEW MARKET STREET, PHILADELPHIA PA.

DIRECTORY

of the Railroads of the United States and Canada, showing the gauge, length of road, number of locomotives and number of cars; and giving the names and titles of their principal officers in charge of the operating, purchasing and rolling stock departments.

A

Adirondack R. R. 4-8½ gauge 62 m. 3 lo. 62 cars.
C. E. Durkee, *Supt* .... Saratoga, N. Y.
Jacob Myers, *M. M* .... Saratoga, N. Y.
Jas. J. Travers, *M. C. B* .... Saratoga, N. Y.
Alabama Great So'n R. R. (*See Cin., N. O. & T. P.*)
Albany & Susquehanna R. R. (*See D. & H. Canal Co.*)
Albert Ry 4-8½ g. 51 m. 3 lo. 32 cars.
G. A. Robinson, *Manager* .... Hillsboro, N. B.
Jas. McKay, *M. M. & C. B* ...... Hillsboro, N. B.
Allegany Central R. R. 3 gauge 30 miles.
Geo. D. Chapman, *Gen. Man.* .. Angelica, N. Y.
W. O. Chapman, *Gen. Supt* ... Friendship, N. Y.
Allegheny Valley R. R. 4-9 g. 259 m. 75 lo. 1968 c.
David McCargo, *Gen. Supt. & Pur. Agt.*; and
C. B. Price, *Supt.* (Riv. Div.) ..... Pittsburg, Pa.
A. A. Jackson, *Supt.* (L. G. Div.). Brookville, Pa.
Geo. W. Glass, *M. M* .... Verona, Pa.
R. Gunning, *M. C. B* .... Verona, Pa.
Alliance & Lake Erie R. R. 3 g. 30 m. 3 lo. 112 cars.
W. E. Lewis, *Gen. Man* .... Alliance, O.
C. C. Dorman, *M. M. & M. C. B* .... Alliance, O.
Annapolis & Elk Ridge R. R. 4-8½ g. 20 m. 4 lo. 29 c.
W. H. Bians, *Supt. & Pur. Agt* .. Annapolis, Md.
John L. Beall, *M. Mach* .... Annapolis, Md.
Arkansas Midland R. R. 3-6 g. 48 m. 4 lo. 45 cars.
A. H. Johnson, *Pr. & Gen. Man* ... Helena, Ark.
J. B. Johnson, *M. M. & M. C. B* ... Helena, Ark.
Ashland Coal & Iron Ry. 4-8½ g. 14 m. 7 lo. 425 c
Douglas Putnam, Jr., *Gen. Supt* .. Ashland, Ky.
Robt. Peebles, *Pur. Agt* .... Ashland, Ky.
E. M. Roberts, *M. M* .... Ashland, Ky.
Ashtabula & Pittsburgh Ry. (*See Penna. Co.*)
Asheville & Spartanburg R. R. 5 g. 49 m. 2 lo. 12 c.
Jas. Anderson, *Supt. & Pur. Agt.* Spart'b'g, S. C.
Wm. Platt, *M. M* .... Spartanburg, S. C.
W. B. Brown, *M. C. B* .... Spartanburg, S. C.
Atchison, Topeka & Santa Fé, R. R.
4-8½ g. 1,846 m. 203 lo. 8,108 cars.
C. C. Wheeler, *Gen. Man* .... Topeka, Kan.
D. J. Chase, *Gen. Supt* .... Topeka, Kan.
W. S. Mellen, *Asst. Gen. Supt* .... Topeka, Kan.
F. M. Smith, *Pur. Agt* .... Topeka, Kan.
Geo. Hackney, *Supt. Lo. & Car. Dept.* do.
Clem. Hackney, *M. M.* .... Topeka, Kan.
Eastern Div.: C. M. Rathbun, *Supt* .. Topeka, Kan
Henry Hull, *G. F. Car Dept* .... Topeka, Kan.
John Fagan, *M. M.* .... Atchison, Kan.
J. M. Smith, *M. M* .... Kansas City, Mo.
W. W. Wheeler, *M. M.* .... Emporia, Kan.
Mid. Div.: H. R. Nickerson, *Supt.* Nickerson, Kan.
W. Y. Johnson, *M. M* .... Nickerson, Kan.
J. Q. Adams, *M. M* .... Dodge, Kan.
Col. Div.: W. W. Borst, *Supt* .... La Junta, Col.
A. C. Stiles, *M. M* .... La Junta, Col.
H. W. Somers, *M. M* .... Raton, N. M.
Las Vegas D.: T. J. Seeley, *Supt.* Las Vegas, N. M.
L. H. Waugh, *M. M* .... Las Vegas, N. M.
Rio G. Div.: F. Leach, Jr., *Supt.* San Marcial, N. M.
M. C. Wheeler, *M. M* .... Wallace, N. M.
T. Clyde, *M. M* .... San Marcial, N. M.
H. P. Olcott, *M. M* .... Deming, N. M.
Atlanta & West Point R. R. (*See Western of Ala.*)
Atlantic & Pacific R. R. 4-8½ g. 286 m.
F. W. Smith *Gen. Supt* ..... Albuquerque, N. M.
B. W. Angell, *Div. Supt* ..... Albuquerque, N. M.
Geo. Chalender, *Supt. M. P. & M.* do.
D. B. Sibley, *Pur. Agt* .... Chicago, Ill.
Augusta & Knoxville R. R. 30 miles.
Gen. Supt & M. M. .. Augusta Ga.

B

Baltimore & Ohio R. R.
4-8½ g. 1,539 m. 546 lo. 14,862 cars.
N. S. Hill, *Pur. Agt* .... Baltimore, Md.
E. Ohio Riv. Div. 4-8½ g. 972 m.
W. M. Clements, *Mast. Trans* .. Baltimore, Md.
N. E. Chapman, *Mast. of Mach* .. Baltimore, Md.
A. J. Cromwell, *Asst. M. of M* . Baltimore, Md.
L. Packard, *M. C. B* .... Baltimore, Md.
I. N. Kalbaugh, *M. M* .... Baltimore, Md.
Wm. Edwards, *M. M* .. Martinsburgh, W. Va.
Sam. Houston, *M. M* .... Piedmont, W. Va.
Robert Maxwell, *M. M* .... Cumberland, Md.
S. B. Crawford, *M. M* .... Grafton, W. Va.
Alex. Laird, *M. M* .... Parkersburg, W. Va.
Chas. Hirsch, *M. M* .... Wheeling, W. Va.
Pitts. Div.: T. M. King, *Gen. Supt* ... Pittsburg, Pa
J. E. Sampsell, *M. of Mach* ... Connelsville, Pa.
Trans-Ohio Divs.: B. Dunham, *G. Man* . Newark, O.
W. H. Harrison, *Mast. of Mach* ..... Newark, O.
E. L. Weisgerber, *M. M* .... Newark, O.
H. M. Ingler, *M. M* .... Bellaire, O.
O. B. Perkins, *M. M* .... Zanesville, O.
Andrew Beckert, *M. M* .... Sandusky, O.
F. J. Gunther, *M. M* ..... Chicago Junction, O.
Chi. Div.: John Thomas, *Supt* .... Chicago, Ill.
Benj. Lowther, *M. M* .... Garrett, Ind.
W. H. Wilkinson, *M. M* .... Kingston, Ill.
Baltimore & Potomac R. R. (*See Penna. R. R.*)
Bangor & Piscataquis R. R. 4-8½ g. 63 m. 4 lo. 87 cars.
Arthur Brown, *Supt* .... Bangor, Me.
C. S. Nason, *M. M* .... Bangor, Me.
J. W. Comins, *M. C. B* .... Oldtown, Me.
Barclay R. R. 4-8½ g. 16 miles.
F. F. Lyon, *Supt* .... Barclay, Pa.
J. A. Hardenburg, *Pur. Agt.* .21 Cort. st., N. Y.
Wm. Johnson, *M. M* .... Towanda, Pa.
Bedford, Springville, Owensburg & Bloomfield Ry.
3 g. 41 m. 5 lo. 65 cars.
Jas. W. Kennedy, *Gen. Supt. & Pur. Agt.*; and
Capt. Geo. Elliott, *M. M* .... Bedford, Ind.
Richard G. Elliott, *M. C. B* .... Bedford, Ind.
Bellaire & South-Western Ry. Co. 3 g. 42 m. 3 lo. 29 c.
S. J. Cochren, *Gen. Man* .... Bellaire, O.
Bell's Gap R. R. 3 g. 23 m. 2 lo. 35 cars.
R. G. Ford, *Supt* .... Bellwood (P. O.). Pa.
A. Zimmerman, *M. C. B* .... Bellwood, Pa.
Bennington & Rutland Ry. 4-8½ g. 9 m. 10 lo. 214 c.
F. C. White, *Supt. & Pur. Agt.* .Bennington, Vt.
G. W. Blanchard, *M. M.* .... Rutland, Vt.
Bingham, Canyon & Camp Floyd, and
Wasatch & Jordan Valley R. R.'s.
3 g. 44 m. 7 lo. 300 cars.
J. G. Kennedy, *Gen. Man.* .Salt Lake City, Utah
Geo. M. Young, *Supt* ...... do. do.
Bodie Lumber Co. 3 g. 34 miles.
Thomas Holt, *Supt. & Pur. Agt* ..... Bodie, Cal
E. M. Luckett, *M. M. & C. B* .... Bodie, Cal
Boston, Barre & Gardner. 4-8½ g. 36 m. 7 lo. 107 c.
H. M. Witter, *Supt. & Pur. Agt.* Worcester, Mass.
Chas. F. Brigham, *M. M* ...... Worcester, Mass.
Boston, Concord, Montreal & White Mts. R. R.
4-8½ g. 167 m. 34 lo. 677 cars
James A. Dodge, *Gen. Man* .... Plymouth, N. H.
J. Thos. Vose, *Pur. Agt* .... Boston, Mass.
R. Adams, *M. M* .... Lake Village, N. H.
G. A. Ferguson, *Asst. M. M.* .. Lake Village, N. H.
L. D. Pickering, *M. C. B* .... Lake Village, N. H.
Boston, Hoosac Tunnel & W'n Ry.
4-8½ g. 53 m. 17 lo. 1,112 cars.
W. V. Reynolds, *Gen. Man* . Mech'ville, N. Y.
J. L. Wellington, *Gen. Supt.* Mechanicville, N. Y.
J. L. Wellington, *P. A* ..... Mechanicville, N. Y.
W. H. Powell, Jr., *M. M* .... Mechanicville, N. Y.
John S. Ellis, *M. C. B* ...... Mechanicville, N. Y.
Boston, Lowell & Concord R. Rs.
4-8½ g. 360 m. 110 lo. 2,211 cars.
H. C. Sherburne, *Gen. Man* ...... Boston, Mass.
F. H. Nourse, *Pur. Agt* .... Boston, Mass.
Jas. T. Gordon, *M. M* .... Concord, N. H.
J. N. Lauder, *Supt. Roll. Stock* . Concord N. H.
Boston & Lowell Div.:
J. F. Crockett, *M. Trans* .... Boston.
Concord Divs.:
H. E. Chamberlain, *Supt* Concord, N. H.
J. T. Gordon, *M. M. & C. B.* Concord, N. H.
Boston, Revere Beach & Lynn R. R. 3 g. 9 m. 5 lo. 46 c.
L. C. Legro, *Supt. & Pur. Agt* .... Boston, Mass.
J. L. Folsom, *M. M* .... Boston, Mass.
John Coghlan, *M. C. B* .... Boston, Mass.

Boston & Albany R. R. 4-8½ g. 372 m. 248 lo. 6,012 c.
C. O. Russell, *Gen. Supt* ..... Springfield, Mass.
W. H. Barnes, *Asst. Supt* .... Boston, Mass.
A. B. Underhill, *Supt. M. P* ... Springfield, Mass.
F. D. Adams, *M. C. B* .... Allston, Mass.
W. H. Russell, *Div. Supt* .... Albany, N. Y.
H. W. Eddy, *Div. M. M* .... Springfield, Mass.
J. B. Weston, *For. C. Sh* ... Springfield, Mass.
G. H. Colby, *Div. M. M* .... Boston, Mass.
T. B. Purvis, *Div. M. M* .... Greenbush, N. Y.
J. E. Doran, *For. C. Sh* .... Greenbush, N. Y.
Boston & Maine R. R. 4-8½ g. 206 m. 84 lo. 2,100 c.
J. T. Furber, *Gen. Supt. & P. A* .. Boston, Mass.
Wm. Smith, *M. M* .... Boston, Mass.
D. C. Richardson, *M. C. B* .... Lawrence, Mass.
Boston & N. Y. Air Line. 4-8½ g. 53 m. 9 lo. 156 c.
Jos. H. Franklin, *Supt* .... New Haven, Conn.
Boston & Providence R. R. 4-8½ g. 67 m. 47 lo. 866 c.
A. A. Folsom, *Gen. Supt* .... Boston, Mass.
Geo. Richards, *M. M* .... Roxbury, Mass.
Jno. Lightner, *M. C. B* .... Roxbury, Mass.
Bradford, Bordell & Kinzua R. R. 3 g. 30 m. 6 lo. 80 c.
B. C. Williams, *Supt. & Pur. Agt* .. Bradford, Pa.
John Delaney, *M. M. & C. B* .... Bradford, Pa.
Bradford, Eldred & Cuba R. R.
C. D. Williams, *Supt. & P. A* .. Wellesville, N. Y.
Breakwater & Frankford R. R. (*See Junc. & Break.*)
Brighthope Ry. 3 g. 37 m. 3 lo. 193 cars.
Jas. R. Worth, *Supt* .... Richmond, Va.
A. Gary, *Supt. Way & Works.* Winterpock, Va.
Alex. Calder, *M. M* .... Chester, Va.
Brunswick & Albany R. R. 5 g. 172 m. 13 lo. 170 c.
R. D. Meader, *Supt* .... Brunswick, Ga.
Buffalo, N. Y. & Phila. Ry. 4-8½ g. 121 m. 34 lo. 2,436 c.
Geo. S. Gatchell, *Gen. Supt* ...... Buffalo, N. Y.
J. H. Poole, *Pur. Agt* .... Buffalo, N. Y.
Allen Vail, *Supt. M. P. & M* .... Buffalo, N. Y.
Henry Wagner, *M. M* .... Buffalo, N. Y.
Buff. Div.: J. T. Gardiner, *Supt* .... Buffalo, N. Y.
N. G. Div.: J. W. Watson, *Supt* ...... Olean, N. Y.
Buff., Pittsburg & W'n R. R. 4-9 g. 165 m. 33 l. 506 c.
Oliver Watson, Jr., *Gen. Supt* .... Buffalo, N. Y.
E. H. Witter, *Pur. Agt* .... Oil City, Pa.
H. J. Bookhammer, *M. M* .... Oil City, Pa.
John Monks, *M. C. B* .... Oil City, Pa.
Burlington, Cedar Rapids & Northern Ry.
4-8½ g. 644 m. 62 lo. 2,120 cars.
C. J. Ives, *Gen. Supt* .... Cedar Rapids, Ia.
Robt. Williams, *Supt* .... Cedar Rapids, Ia.
T. Stickney, *Pur. Agt* .... Cedar Rapids, Ia.
R. W. Bushnell, *M. M. & C. B* Cedar Rapids, Ia.
Burlington & Lamoille R. R. 4-8½ g. 36 m. 3 lo. 61 c.
G. L. Linsley, *Gen. Man. & Supt.* Burlington, Vt.
F. G. Brownell, *M. M. & P. A* ... Burlington, Vt.
Burlington & Mo. Riv. R. R. (in Neb.) (*See C., B & Q.*)
Burlington & North-West'n Ry. 3 g. 38 m. 3 lo. 85 c.
John T. Gerry, *Supt* .... Burlington, Ia.
Burlington & Ohio River R. R.
G. P. Merrill, *Gen. Man. & Pur. Agt.* Chicago, Ill.
J. K. Lape, *Supt. of Equip* .... Chicago, Ill.

C

Camden & Atlantic R. R. 4-8½ g. 79 m. 16 lo. 264 c.
F. A. Lister, *Supt & Pur. Agt* .... Camden, N. J
Rufus Hill, *M. M* .... Camden, N. J.
Samuel Wills, *M. C. B* .... Camden, N. J.
Canada Southern Ry. 4-8½ g. 403 m. 89 l. 3,367 c.
W. P. Taylor, *Gen. Man* .... Buffalo, N. Y.
A. F. Howland, *Pur. Agt* ..... St. Thomas, Ont.
W. A. Short, *Gen. M. M* .... St. Thomas, Ont.
Rob't Potts, *Gen. M. C. B* ..... St. Thomas, Ont.
Can. Div.: W. E. Carroll, *Supt* .. St. Thomas, Ont.
Robert Potts, *M. C. B* .... St. Thomas, Ont.
U. S. Div.: E. P. Murray, *Supt* .... Toledo, O.
O. P. Dunbar, *M. M* .... Grosse Isle, Mich.
Canadian Pacific R. R. 4-8½ g. 551 m. 26 lo. 473 c.
W. C. Van Horne, *Gen. Man.* Winnipeg, Man.
Eastern Div. 240 m. 16 lo. 276 cars.
Archer Baker, *Gen. Supt* ..... Montreal, Can.
Tho. Irwin, *Mech. Supt* ...... Brockville, Ont.
Western Div. 311 m. 10 lo. 207 cars.
A. B. Stickney, *Gen. Supt* .... Winnipeg, Man.
Geo. P. Nelson, *Pur. Agt* ..... Winnipeg, Man.
F. C. Butterfield, *M. M. & M. C. B.* Winnipeg, Man.
Cape F'r & Yadkin Val. R. R. 4-8½ g. 47 m. 3 lo. 31 c.
L. C. Jones, *Gen. Supt* .... Fayetteville, N. C.
Isaac W. Clark, *M. M. & C. B.* Fayetteville, N. C.
Caroline Central R. R. (*See Ral. & Aug.*)
Carson & Colorado R. R. (*See Va. & Truckee.*)
Catasauqua & Fogelsville. 4-8½ g. 25 m. 6 lo. 577 c.
C. W. Chapman, *Supt. & P. A* Catasauqua, Pa.
Thos. E. Evans, *M. M* ...... Catasauqua, Pa.
Chas. J. Holbach, *M. C. B* .... Catasauqua, Pa.
Central and South-Western Railroads (Ga.).
5 g. 975 m. 127 lo. 1,858 cars.
W. G. Raoul, *V. P. and G. Man.* Savannah, Ga.
Wm. Rogers, *Gen. Supt* .... Savannah, Ga.
Henry Yonge, *Pur. Agt* .... Savannah, Ga.
Cen. Div.: D. D. Arden, *M. M* ...... Savannah, Ga.
John McCann, *M. M* .... Augusta, Ga.
R. M. Barthlemess, *M. C. B* .... Savannah, Ga.
So.-West'n Div.: W. F. Shellman, *Supt.* Macon, Ga.
D. M. Gugel, *M. M* .... Macon, Ga.
James A. Knight, *M. C. B* ...... Macon, Ga
Central R. R. of N. J. 4-8½ g. 544 m. 294 lo. 27,198 c.
Gen. Man ... New York, N. Y.
B. W. Burnett, *Pur. Agt* ...... New York, N. Y.
W. W. Stearns, *Gen. Supt* ..... Elizabeth, N. J.
Cen Div.: Wm. Woodcock, *M. M* .. Elizabeth, N. J.
Geo. Hackett, *M. C. B* .... Elizabeth, N. J.
C. G. Williams, *M. M* .... Jersey City, N. J.
John Alpaugh, *M. M* .... Phillipsburg, N. J.
Long Br. Div.: J. F. Randolph, *Supt.* Elizabeth, N. J.
N. J. So. Div.: R. Blodgett, *Supt* ... Manchester, N. J.
Wm. Montgomery, *M. M* .... Manchester, N. J.
Chas. N. Sawyer, *M. C. B* .... Manchester, N. J.
Lehigh & Susquehanna Div.:
W. S. Polhemus, *A. G. Supt.* Mauch Chunk, Pa.
L. C. Brastow, *M. M. & C. B* ...... Ashley, Pa.
Central R. R. of S. C. (*See Wil. & Wel.*)
Central Iowa Ry. 4-8½ g. 244 m. 37 lo. 1,487 cars.
D. N. Pickering, *Gen. Supt* ... Marshalltown, Ia.
John Player, *M. M* .... Marshalltown, Ia.
T. L. Seevers, *M. C. B* .... Marshalltown, Ia.
Central Pac. R. R. 4-8½ g. 2,777 m. 296 lo. 7,277 c.
A. N. Towne, *Gen. Man* .... San Francisco, Cal.
J. A. Fillmore, *Gen. Supt* ... San Francisco, Cal.
R. H. Pratt, *A. G. Supt* .... San Francisco, Cal.
J. R. Watson, *Gen. Pur. Agt* .. Sacramento, Cal.
A. J. Stevens, *Gen. M. M* ..... Sacramento, Cal.
Benj. Welch, *Gen. M. C. B* .... Sacramento, Cal.
G. J. Turner, *M. C. B* ...... Sacramento, Cal.
West'n; Visalia Tulare Divs. and North'n R. R.:
A. D. Wilder, *Supt* .... W. Oakland, Cal.
G. D. Welch, *M. M.* (W. Div.) W. Oakland, Cal.
W. D. Ludlow, *M. C. B.* (W. Div.) do.
S. J. Johnson, *M. M.* (T. Div.) ..... Tulare, Cal.
D. Rutherford, *M. M.* (N. Rd.) .S. Vallejo, Cal.
Sacramento; Oregon Divs.; and Cal. Pac. R. R.
J. B. Wright, *Supt* .... Sacramento, Cal.
M. W. Cooley, *M. M* .... Sacramento, Cal.
Phil. Douglas, *For. Car Sh* .. Sacramento, Cal.
Truckee Div.: Frank Free, *Supt.* Wadsworth, Nev.
Geo. Gregg, *M. M* .... Wadsworth, Nev.
Wm. McPherson, *F. Car Sh* .. Wadsworth, Nev.
Humb't Div.: G. W. Coddington, *Supt.* Carlin, Nev.
W. F. Smith, *M. M* .... Carlin, Nev.
J. C. Doughty, *For. Car Sh* ...... Carlin, Nev.
Salt Lake Div.: A. G. Fell, *Supt* ..... Ogden, Utah.
James Lamb, *M. M* .... Terrace, Utah.
A. Sherburne, *For. Car Sh* ..... Ogden, Utah.
Los Angeles; and Yuma Divs. (So. Pac.):
E. E. Hewitt, *Asst. Supt* .... Los Angeles, Cal.
James Velsir, *M. M* .... Los Angeles, Cal.
J. S. Young, *For. Car Sh* .... Los Angeles, Cal.
Arizona Div. (So. Pac.):
A. A. Bean, *Asst. Supt* .... Tucson, Ariz.
Rio Grande and El Paso Divs. (So. Pac.):
J. Campbell, *Ass't Supt* .... El Paso, Texas.
H. C. Standish, *For. Sh* ..... El Paso, Texas.
Central Vermont R. R. 4-8½ g. 548 m. 132 lo. 2,522 c.
J. W. Hobart, *Gen. Supt* .... St. Albans, Vt.
J. M. Foss, *A. G. S. & S. of M. P. & M.* St. Albans, Vt
No. Div.: J. B. Futvoye, *Supt* ..... St. Johns, P. Q.
Rut. Div.: J. Burdett, *Supt* .... Rutland, Vt.
N. L. Davis, *M. M. & C. B* .... Rutland, Vt.
New London & No'n R. R. 143 m. 22 lo. 303 c.
G. W. Bentley, *G. Supt. & P. A* ... New London, Ct.
I. W. Dow, *M. M* .... New London, Ct.
S. O. Banks, *M. C. B* .... New London, Ct.

Charleston & Savannah Ry. 5 g. 115 m. 17 lo. 98 c.
H. S. Haines, *Gen. Man* .... Savannah, Ga.
C. S. Gadsden, *Gen. Supt* ..... Charleston, S. C.
H. A. Ulmo, *M. M* .... Savannah, Ga.
J. D. Murphy, *M. C. B* .... Savannah, Ga.
Charlotte, Columbia & Augusta R. R. (*See Rich. & D.*)
Chateaugay R. R. 3 g. 34 m. 6 lo. 125 cars.
A. L. Inman, *Gen. Man* .... Plattsburg, N. Y.
J. M. Davis, *Supt. & M. M* .... Plattsburg, N. Y.
Chattaroi Ry. 4-8½ g. 43 miles 11 loco. 483 cars.
C. H. Rockwell, *Gen. Man. & P. A.* Ashland, Ky.
W. C. Pendleton, *M. M* .... Ashland, Ky.
Joseph Burley, *M. C. B* .... Ashland, Ky.
Cheraw & Chester R. R. 3 g. 30 m. 3 lo. 38 cars.
W. H. Harding, *Pres. & Supt* ..... Chester, S. C.
A. M. Manning, *M. M* .... Chester, S. C.
Cheraw & Darlington R. R. (*See Wil. & Wel.*)
Cheraw & Salisbury R. R. (*See Wil. & Wel.*)
Cherokee R. R. 3 g. 37 m. 5 lo. 50 cars.
John Postel, *Manager* .... Atlanta, Ga.
C. E. Scruten, *M. M. & C. B* .... Cedartown Ga.
Chesapeake, Ohio & So.-W'n. 5 g. 365 m. 8 lo. 102 c.
R. Meek, *G. S. & Pur. Agt.* Elizabethtown, Ky.
W. D. Robb, *M. M* .... do.
C. A. Simon, *M. M. & C. B* ...... Paducah, Ky.
Chesapeake & Ohio Ry. 4-8½ g. 642 m. 133 l. 3,543 c.
C. W. Smith, *Gen. Man* .... Richmond, Va.
A. H. Wood, *Asst. to Gen. Man* .... do.
A. S. Emmons, *Pur. Agt* .... Richmond, Va.
John McFarland, *Supt. M. P* ... Richmond, Va.
Eastern Div.: E. T. Smith, *Supt* .. Richmond, Va.
J. N. King, *M. C. B* .... Richmond, Va.
Hunt. Div.: W. P. Harris, *Supt.*; and
T. L. Chapman, *Asst. Supt. M. P.*; and
H. C. Bassinger, *M. C. B.* Huntington, W. Va.
Lex. Div.: J. D. Yarrington, *Supt.* .Lexington, Ky.
Chesnire R. R. 4-8½ g. 80 m. 30 lo. 499 cars.
R. Stewart, *Gen. Man* .... Keene, N. H.
H. H. Stone, *Pur. Agt* .... Keene, N. H.
F. A. Perry, *M. M* .... Keene, N. H.
A. E. Howard, *G. For. Car Sh* .... Keene, N. H.
Chester & Lenoir Ry. 3 g. 50 m. 3 lo. 23 cars.
James Mason, *Supt* .... Yorkville, S. C.
T. P. Beard, *M. M* .... Yorkville, S. C.
Chicago, B. & Kan. City Ry. 4-8½ g. 181 m. 9 lo. 130 c.
J. W. Smith, *Gen. Supt* .... Keokuk, Ia.
W. H. Bartlett, *Act. M. M* ..... Burlington, Ia.
A. B. Allen, *M. C. B* .... Farmington, Ia.
Chicago, Burlington & Quincy R. R.
4-8½ g. 2,924 m. 441 lo. 16,499 cars.
T. J. Potter, *Gen. Man* .... Chicago, Ill.
H. B. Stone, *Supt. Lo. & Car Dept* .. Chicago, Ill.
G. W. Rhodes, *S. M. P. & M* .... Aurora, Ill.
Wm. Forsyth, *Mech. Eng* .... Aurora, Ill.
(1) C., B. & Q., East of Mo. Riv. 1,938 miles.
H. B. Stone, *Gen. Supt* .... Chicago, Ill.
Geo. B. Harris, *Pur. Agt* .... Chicago, Ill.
Ill. Divs.: J. D. Besler, *Supt* .... Galesburg, Ill.
Chi. Div.: Geo. Alexander, *Supt* ..... Aurora, Ill.
L. E. Johnson, *M. M* .... Aurora, Ill.
Galesburg Div.: F. C. Rice, *Supt.* Galesburg, Ill.
Robert Colville, *M. M* .... Galesburg, Ill.
St. L. Div.: S. E. Crance, *Supt* .... St. Louis, Mo.
A. Forsyth, *M. M* .... Beardstown, Ill.
Ia. & Mo. Divs.: K. H. Wade, *Supt* .. Burlington, Ia.
East. Div.: C. M. Levy, *Supt* ..... Burlington, Ia.
Joel West, *M. M* .... Burlington, Ia.
Mid. Div.: D. T. Bacon, *Supt* ...... Ottumwa, Ia.
West'n Div.: W. T. Ryder, *Supt* .... Creston, Ia.
C. W. Eckerson, *M. M* .... Creston, Ia.
(2) C., B. & Q., West of Mo. Riv. 935 miles.
G. W. Holdredge, *Gen. Supt* ...... Omaha, Neb.
Geo. Hargreaves, *Pur. Agt* .... Omaha, Neb.
D. Hawksworth, *Gen. M. M* .. Plattsmouth, Neb.
Bur. & Mo. Riv. & Neb. Ry. Divs.:
J. B. Phillippi, *Supt* .... Lincoln, Neb.
O. R. Newton, *M. M* .... Lincoln, Neb.
R. V. Div.: A. Campbell, *Supt* ..... Hastings, Neb.
A. & N. Div.: J. McConniff, *Supt* ... Lincoln, Neb.
Chicago, Milwaukee & St. Paul R. R.
4-8½ g. 3,951 m. 425 lo. 13,659 cars.
S. S. Merrill, *Gen. Man* .... Milwaukee, Wis.
J. T. Clarke, *Gen. Supt* .... Milwaukee, Wis.
J. T. Crocker, *Pur. Agt* .... Milwaukee, Wis.
J. M. Lowry, *Gen. M. M* .... Milwaukee, Wis.
H. Watkeys, *M. M* .... W. Milwaukee, Wis.
John Bailie, *Supt. Car Dept* ... Milwaukee, Wis.
La Crosse; Pr. du Chien; Wis. Val.; Chi.; and Chi. & Pac. Divs.:
H. C. Atkins, *Supt* .... Milwaukee, Wis.
Northern Div.: L. B. Rock, *Supt* .. Milwaukee, Wis.
Wm. E. Kittredge, *M. C. B* .. Milwaukee, Wis.
So.-Wn. Divs.: D. A. Olin, *Supt* .... Racine, Wis.
John Taylor, *M. M* .... Racine, Wis.
E. A. Eddy, *M. C. B* .... Racine, Wis.
Lines West of Mississippi River:
C. H. Prior, *A. Gen. Supt* .... Minneapolis, Minn.
H. & D. Div.: C. W. Case, *Supt* Minneapolis, Minn.
J. O. Pattie, *M. M* .... Minneapolis, Minn.
Ia. & Minn. Div.: H. R. Williams, *Supt.* do.
So. M. Div.: F. D. Underwood, *Supt.* La Crosse, Wis
Ia. & Da. Div.: G. W. Sanborn, *Supt.* Mason City, Ia.
S. Cy. & Da. Div.: J. Jackson, *Supt.* Sioux City, Ia.
F. H. Moulton, *M. M* .... Yankton, Dak.
M. Pt. Div.: G. W. Cobb, *Supt* .... Mineral Pt., Wis.
Dubuque Div.: J. H. Jenkins, *Supt* .. Dubuque, Ia
S. Charnley, *M. M* .... Dubuque, Ia.
Chicago, Pekin & So.-Wn. R. R. 4-8½ g. 88 m. 8 lo. 455 c.
A. H. Crocker, *Rec* .... Joliet, Ill.
A. H. Cook, *Pur. Agt* .... Chicago, Ill.
A. R. Overton, *M. M* .... Joliet, Ill.
F. Shields, *M. C. B* .... Streator, Ill.
Chicago, Rock Island & Pac. Ry.
4-8½ g. 1,381 m. 290 lo. 17,799 cars.
R. R. Cable, *V. P. & Gen. Man* .... Chicago, Ill.
A. Kimball, *Gen. Supt* .... Davenport, Ia.
F. A. Marsh, *Pur. Agt* .... Chicago, Ill.
T. B. Twombly, *Gen. M. M* .... Chicago, Ill.
B. K. Verbryck, *Gen. M. C. B* ...... Chicago, Ill.
Ill. Div.: R. H. Chamberlin, *Supt* ..... Chicago, Ill.
R. Biester, *M. M* .... Chicago, Ill.
Sam'l Pullman, *M. C. B* .... Chicago, Ill.
Ia. Div.: H. F. Royce, *Supt* .... Des Moines, Ia
J. G. Crockett, *M. M* .... Stuart, Ia.
Jas. E. Morrill, *M. M* .... Davenport, Ia.
Chas. M. Leonard, *M. C. B* ...... Davenport, Ia.
So.-Wn. Div.: G. F. Walker, *Supt* ..... Trenton, Ia.
R. A. Carscadin, *M. M* .... Trenton, Ia.
Chas. R. Best, *M. C. B* .... Trenton, Ia.
K. & Des. M. Div.: Jno. Given, *Supt* ... Keokuk, Ia.
S. W. Wakefield, *M. M* .... Keokuk, Ia.
Henry Kummer, *M. C. B* .... Keokuk, Ia.
Chi., Saginaw & Can. R. R. 4-8½ g. 38 m. 4 lo. 16 c.
J. A. Elwell, *Gen. Man. & Pur. Agt.* St. Louis, Mich.
Jas. T. Hall, *Supt* .... St. Louis, Mich.
Chicago, St. Louis & New Orleans R. R.
4-8½ g. 571 m. 101 lo. 1,913 cars.
J. C. Clarke, *V. P. & G. Man* .. New Orleans, La
L. T. Brien, *Asst. Gen. Man* .. New Orleans, La.
C. M. Sheafe, *Gen. Supt* ...... New Orleans, La.
H. B. Febiger, *Pur. Agt* .... New Orleans, La.
W. H. Purdy, *Supt. Mach* .. McComb City, Miss.
Geo. W. Baxter, *M. C. B* ... McComb City, Miss.
So. Div.: E. D. Anderson, *Acting Supt.* do.
W. P. McKinley, *M. M* ... McComb City, Miss.
No. Div.: J. G. Mann, *Supt* .... Jackson, Tenn.
J. M. Keith, *M. M* .... Jackson, Tenn.
J. F. White, *M. M* .... Water Valley, Miss
Chicago, St. Paul, Minneapolis & Omaha Ry.
4-8½ g. 1,037 m. 131 lo. 4,688 cars.
C. F. Hatch, *Gen. Supt* .... St. Paul, Minn.
W. H. S. Wright, *Pur. Agt* ...... St. Paul, Minn.
Matt. Ellis, *M. M* .... St. Paul, Minn.
W. B. Rice, *M. C. B* .... St. Paul, Minn.
Ea. & No. Div.: T. P. Gere, *Supt* . St. Paul, Minn.
St. Paul Div.: J. F. Lincoln, *Supt* St. Paul, Minn.
Sioux City Div.: H. Spencer, *Supt.* Sioux City, Ia.
F. W. Heintselman, *Gen. For. Sh.* Sioux Cy, Ia.
Neb. Div.: G. V. Morford, *Supt* ...... Omaha, Neb.
Chicago, Texas & Mexican Central Ry.
4-8½ g. 52 m. 4 lo. 60 cars.
Gen. Supt .... Dallas, Tex.
Chas. Howard, *Pur. Agt* .... Chicago, Ill.

Chicago & Alton R. R. 4-8½ g. 840 m. 213 lo. 6,148 c.
J. C. McMullin, *Gen. Man* .... Chicago, Ill.
W. F. Merrill, *Gen. Supt* .... do.
A. V. Hartwell, *Pur. Agt* .... Chicago, Ill.
Wm. Wilson, *Supt. of Mach* ... Bloomington, Ill.
Jos. Townsend, *G. For. Car Dept.* do.
Chi. Div.: A. M. Richards, *Supt* .. Bloomington, Ill.
St. Louis Div.: T. M. Eates, *Supt* .. Roodhouse, Ill.
Kan. Cy. Div.: O. Vaughan, *Supt* ...... Slater, Mo.
Wm. McPhail, *M. M* .... Slater, Mo.
Chi. & East'n Ill. 4-8½ g. 248 m. 56 lo. 3,000 cars.
O. S. Lyford, *Gen. Supt* .... Chicago, Ill.
D. R. Patterson, *Pur. Agt* .... Chicago, Ill.
P. W. Drew, *M. Trans* .... Chicago, Ill.
Allen Cook, *M. M* .... Danville, Ill.
Jas. T. Kerney, *M. C. B* .... Danville, Ill.
Chicago & Grand Trunk Ry. (*See Grand Trunk.*)
Chicago & Iowa R. R. 4-8½ g. 104 m. 15 lo. 237 cars.
T. J. Potter, *Gen. Man* .... Chicago, Ill
W. H. Holcomb, *Rec* .... Rochelle, Ill.
H. S. Bryan, *M. M* .... Aurora, Ill.
Chicago & Northwestern Ry.
4-8½ g. 3,281 m. 476 lo. 16,673 cars.
Marvin Hughitt, *2d V. Prs. & G. M.* Chicago, Ill.
J. D. Layng, *Gen. Supt* .... Chicago, Ill.
W. G. Brownson, *Asst. Supt* .... Boone, Ia.
R. W. Hamer, *Pur. Agt* .... Chicago, Ill.
Geo. W. Tilton, *Supt. M. P. & M.*; and
J. M. Boon, *A. Supt. M. P. & M* .... Chicago, Ill.
Wis. and Mil. Divs. & Sheboygan & W'n Ry.:
Chas. D. Gorham, *Supt* .... Chicago, Ill.
Gal. Div.: Chas. Murray, *Supt* .... Chicago, Ill.
Pen'r Div.: W. B. Linsley, *Supt* .... Escanaba, Mich.
Geo. H. White, *M. M* .... Escanaba, Mich.
Mad. Div.: C. A. Swineford, *Supt* .. Baraboo, Wis.
Win. & St. P. Div.: S. Sanborn, *Supt.* Winona, Minn
W. A. Scott, *M. M* .... Winona, Minn.
Dak. Cen. Ry.: T. J. Nicholl, *Supt* .... Huron, Dak.
Mil. & Mad. Ry.: J. B. Trull, *Supt* ...... Galena, Ill.
Ia. Div.: J. M. Whitman, *Supt* .... Clinton, Ia.
J. O. Chapman, *M. M* .... Clinton, Ia.
H. L. Preston, *M. C. B* .... Clinton, Ia
No. Ia. Div.: H. G. Burt, *Supt* .... Eagle Grove, Ia.
Chicago & West Michigan:
4-8½ g. 366 m. 43 lo. 1,345 cars.
Geo. C. Kimball, *V. P. & G. Man.* .Muskegon, Mich.
C. Harris, *Gen. Supt* .... " "
H. Park, *Pur. Agt* .... " "
L. E. Hitchcock .... " "
C. & W. M. Rd: C. M. Lawler, *Supt* St. Joseph, Mich.
Russell Booth, *M. M* .... Muskegon, Mich.
Gr. Hav. Rd.: F. H. May, *Manager.* Allegan, Mich.
Russell Booth, *M. M* .... Muskegon, Mich.
Gr. Rap. Rd.: A. M. Nichols, *Supt.* Gr. Rapids, Mich
C. J. Howard, *M. M* ..... Grand Rapids, Mich.
Cincinnati, Columbus & Hocking Val. Ry.
4-9 g. 25 m. 1 lo. 27 cars.
J. E. Gimperling, *Gen Man* .... Dayton, O.
Geo. F. Robinson, *Supt* ...... Washington, O.
Cin., Georgetown & Portsmouth. 3 g. 35 m. 2 lo. 39 c.
A. T. Roever, *Gen Man* .... Cincinnati, O.
J. C. Homer, *M. M* .... Cincinnati, O.
Cincinnati, Green Riv. & Nashville R. R. 3 g.
A. C. Sim, *Supt* .... King's Mountain, Ky.
G. Brashears, *Pur. Agt* .... Cincinnati, O.
Cincinnati, Hamilton & Dayton R. R. (*See C., C., C. & I.*)
Cincinnati, Indianapolis, St. Louis & Chicago Ry.
4-8½ g. 345 m. 60 lo. 1,930 cars.
J. W. Sherwood, *Supt* .... Indianapolis, Ind.
Geo. Tozzer, *Pur. Agt* .... Cincinnati, O.
J. S. Patterson, *M. of Mach. & M. C. B.* Cincinn., O.
Cincinnati, New Orleans & Texas Pacific Ry. Co.
5 g. 841 m. 96 lo. 2,687 cars.
John Scott, *V. Pres. & Gen. Man.* .Cincinnati, O.
James Meehan, *Gen. M. M* .... Ludlow, Ky
Cin. So. Div.: Cecil Fleming, *Gen. Supt* .. Cin., O.
Julius Uihlein, *Pur. Agt* .... Cincinnati, O.
Frank Allingham, *M. M* .... Cincinnati, O.
A. Thomson, *M. M* .... Chattanooga, Tenn.
Ala. Gr. S'n Div.: C. B. Wallace, *Gen. Supt.* and
R. W. Healey, *Pur. Agt* .... Chattanooga, Tenn.
George Manuell, *M. M* .... Chattanooga, Tenn.
Fred Morgan, *M. C. B* ..... Chattanooga, Tenn.
V. & M. Div.: E. F. Raworth, *G. S.* Vicksburg, Miss
James B. Browne, *M. M* ...... Vicksburg, Miss.
V. S. & P. Div.: F. Y. Dabney, *Supt.* .Monroe, La.
W. Bell Smith, *M. M. & C. B* .... Monroe, La.
Cincinnati Northern Ry. 3 g. 30 m. 4 lo. 60 c.
G. L. Barringer, *Gen. Man* .... Cincinnati, O.
C. W. Bradley, *Pur. Agt* .... Cincinnati, O.
T. J. Hamer, *M. M. & C. B* .... Cincinnati O.
Cincinnati, Selma & Mobile R. R. 5 g. 45 m. 2 lo. 39 c.
D. McLaren, *Supt* .... Selma, Ala.
Simon Hertz, *Pur. Agt* .... Selma, Ala.
J. M. Levis, *M. M* .... Marion, Ga.
Cincinnati Southern Ry (*See Cin., N. O. & Tex. Pac.*)
Cin., Wabash & Mich. Ry. 4-8½ g. 110 m. 8 lo. 139 c.
Norman Beckley, *Gen. Man. & P. A.* Elkhart, Ind.
O. W. Lamport, *Supt* .... Wabash, Ind.
S. B. Tinker, *M. M. & M. C. B* .... Wabash, Ind.
Cincinnati & Eastern Ry. 3 g. 76 m. 4 lo. 66 cars.
P. W. Naughton, *M. M* .... Cincinnati, O.
Clarksburg, Weston & Glenville R. R.
3 g. 26 m. 2 lo. 21 cars.
A. H. Kunst, *Supt* .... Weston, W. Va.
Sam. A. Steel, *M. M* .... Weston, W. Va.
F. Dillie, *M. C. B* .... Nottingham, O.
Cleve., Akron & Col. R. R. 4-9 g. 144 m. 14 lo. 638 c.
N. Monsarrat, *Gen Supt* .... Akron, O.
M. M. & C. B .... Akron, O.
Cleve., Col., Cin. & Ind. Ry:
Cin., Ham. & Dayton and Ind. & St. Louis.
4-8½ g. 812 m. 246 lo. 7,082 cars.
J. H. Devereux, *Pres* .... Cleveland, O.
E. B. Thomas, *Gen. Man* .... Cleveland, O.
J. L. Yale, *Pur. Agt* .... Cleveland, O.
W. F. Turreff, *Gen. M. M* ...... Cleveland, O.
(1) Cl., Col., Cin. & Ind. Divs. 471 m. 162 lo. 4,768 c.
Col. & Cin. Div.: Robt. Blee, *Supt* . Cleveland, O.
W. L. Gilmore, *M. M* .... Cleveland, O.
A. G. Steinbrenner, *G. For. Car Dept.* do.
Ind'p'lis Div.: C. C. Gale, *Supt.* Indianapolis, Ind.
J. K. Lape, *M. M* .... Brightwood, Ind.
N. Mark, *G. For. Car Dept.* Brightwood, Ind.
Day. & Union: H. S. Gordon, *M. M* .... Dayton, O.
(2) Cin., Ham. & Day. Divs. 341 m. 84 lo. 2,314 c.
J. H. Barrett, *Gen. Supt* .... Cincinnati, O.
Jas. Eckford, *M. M* .... Cincinnati, O.
W. H. H. Allison, *G. For. Car Dept.* do.
C. R. & C. Div.: W. S. Brewer, *M. M.* Richm'd, Ind.
D. & M. Rd.: J. H. Barrett, *Supt* .... Toledo, O.
Jno. Black, *M. M* .... Lima, Ohio.
Cleveland & Pittsburg R. R. (*See Penna. Co.*)
Cleveland, Tuscarawas Valley & Wheeling Ry.
4-8½ g. 158 m. 23 lo. 1,522 cars.
Oscar Townsend, *Gen. Man* ...... Cleveland, O.
Wm. Thornburg, *Supt* .... Cleveland, O.
W. A. Stone, *M. M* .... Lorain, O.
Cleve. & Marietta R. R. 4-8½ g. 99 m. 9 lo. 157 cars.
S. C. Baldwin, *Gen. Man* .... Marietta, O.
R. B. Hoover, *Pur. Agt* .... Marietta, O.
E. C. Hill, *M. M* .... Marietta O.
Coburg, Peterborough & Marmora Ry.
5-6 g. 47 m. 5 lo. 207 cars.
Jas. R. Barber, *Gen. Supt* .... Cobourg, Ont.
Jas. Clark, *M. M* .... Cobourg, Ont.
John Tinney, *M. C. B* .... Cobourg, Ont.
Columbia & Greenville R. R. (*See Rich. & Dan.*)
Columbus, Hocking Valley & Toledo Ry.
4-9 g. 319 m. 76 lo. 6,000 cars.
Orland Smith, *Gen Man* .... Columbus, O.
G. R. Carr, *Gen. Supt. & Pur. Agt.* Columbus, O.
J. G. Hutchins, *M. M* .... Columbus, O.
J. M. Rockafield, *M. C. B* .... Columbus, O.
Tol. Div.: M. T. Seymour, *Supt* ...... Columbus, O.
Hock. V. Div.: M. P. L. Booth, *Supt.* Columbus, O.
Ohio Riv. Div.: C. D. Norris, *Supt* .... Logan, O.
Columbus & Maysville Ry. (*See Cin. & East.*)
Columbus & Rome R. R. 3 g. 32 m. 2 lo. 25 cars.
M. E. Gray, *Supt* .... Columbus, O.
Columbus & Western Ry. 5 g. 89 m. 2 lo. 19 cars.
E. A. Llewellen, *Gen. Man* ...... Columbus, Ga.
R. A. Bridges, *M. M* .... Opelika, Ala.
Concord & Claremont R. R. (*See Northern of N. H.*)
Conn. Riv. and Ver. Val. R. Rs. 4-8½ g. 130 m. 33 lo. 456 c
J. Mulligan, *Supt. & Pur. Agt.* Springfield, Mass
W. H. Stearns, *M. M* .... Springfield, Mass.
Robert Hitchcock, *M. C. B* ... Springfield, Mass

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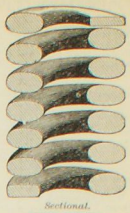
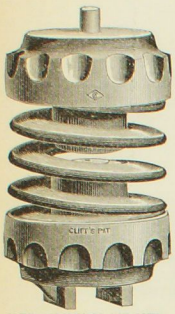
MANUFACTURERS OF

Railway Car Springs,

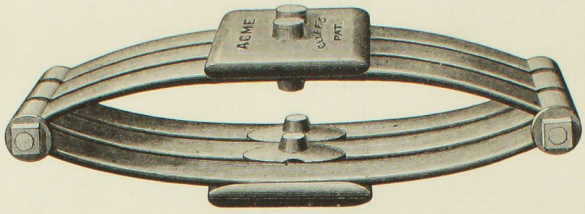
CLIFF BUFFER.
5½ by 8. 2¼ in. hole.
Capacity, 16,000 lbs.



Sectional.
CLIFF BUFFER.
5½ x 8. 2¼ in. hole.
Capacity, 16,000 lbs.



CLIFF'S GRADUATED EQUALIZER.
7½ in. diam., 11½ in. high.
Capacity graduated from 7,000 to 10,000 lbs.



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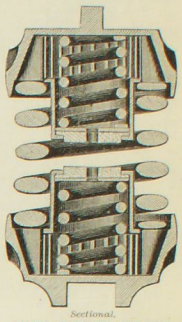
CLIFF'S PATENT, MARCH 29, 1881.
22 in. long. 6¼ in. bearing to bearing.
Capacity, 28,500 lbs.



Sectional.
CLIFF'S GRADUATED EQUALIZER.
7½ in. diam., 11½ in. high.
Capacity graduated from 7,000 to 10,000 lbs.

MORSE BUILDING, NEW YORK.

IN THE PATENT FIGHT

BETWEEN

D. A. HOPKINS, of 113 Liberty Street, N. Y.,

PATENTEE AND MANUFACTURER OF

SELF-FITTING JOURNAL BEARINGS,

AND

T. V. LE ROY,

A SECOND DECISION WAS RENDERED JUNE 7, 1881,

IN FAVOR OF HOPKINS.

The closing paragraphs of said decision read as follows:

"As the proofs stand, therefore, Hopkins was the first to conceive, the first to disclose to others, the first to embody in models, the first to reduce to practice, and the first to apply for a patent. Le Roy was first to obtain a patent, but under circumstances which do not give him the prima facie case which a patent usually implies."

"We must find priority of invention to be with D. A. Hopkins, and affirm the examiner's decision."

H. H. BATES,
R. L. B. CLARKE,
R. G. DYRENFORTH,
Examiners-in-Chief.

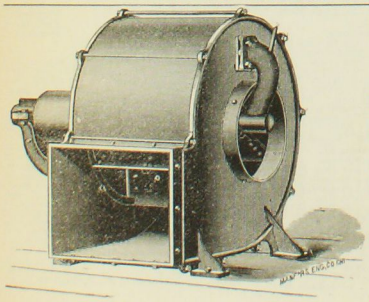
WILSON, WALKER & CO.

(LIMITED),

MANUFACTURERS OF ALL KINDS OF

RAILROAD CAR AND LOCOMOTIVE FORGINGS,

PITTSBURGH, PA.



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SPECIALTIES:
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JEWETT'S PERFECTLY PURE LINSEED OIL RAW, BOILED & REFINED

All Linseed Oil bearing the above brand delivered by us is of OUR OWN MANUFACTURE, and guaranteed absolutely pure
Our BOILED OIL will be, as heretofore POSITIVELY BOILED

JOHN JEWETT & SONS

181 FRONT STREET, NEW YORK.

Connotton Valley R. R. 3 g. 109 m. 10 lo. 531 cars.
W. W. Hungerford, *Gen. Man.*....Canton, O.
W. N. Moffet, *Supt*....Canton, O.
A. B. Proal, *Pur. Agt*....Canton, O.
E. W. Poorman, *M. M.*....Canton, O.
Cornwall R. R.. 4-8½ g. 9 m 5 lo. 166 cars.
Frank Donahue, *G. Supt. & M. M* Lebanon, Pa.
Levi Blonch, *M. C. B.*....Lebanon, Pa.
Credit Valley Ry. 4-8½ g. 184 m. 22 lo. 484 cars.
James Ross, *Gen. Supt*....Toronto, Ont.
John Macnab, *Pur. Agt*....Toronto, Can.
H. G. Taylor, *Mech. Supt*....Toronto, Can.
Crown Point Iron Co. R. R. 3 g. 13 m.
A. L. Inman, *Gen. Man*....Plattsburg, N. Y.
J. M Davies, *Supt. & M. M.*.Crown Point, N. Y.
J. C. Sherman, *M. C. B.*.... Crown Point, N. Y.
Cumberland & Pennsylvania R. R. 4-8½ g. 55 m.
P. L. Burwell, *Gen Supt & P A.*Cumberland, Md.
N. W. Howson, *Mast. of Mach.*Mt. Savage, Md.
Nathan Binix, *M. C. B.*....Mt. Savage, Md.
Cumberland Valley R. R. 4-9 g. 125 m. 21 lo. 280 cars.
J. F. Boyd, *Supt*....Chambersburg, Pa.
A. S. Hull, *M. M.*....Cnambersburg, Pa.
C. Wickey, *F. C. R.*....Chambersburg, Pa.

D

Danbury & Norwalk R. R. 4-8½ g. 33 m. 6 lo. 100 c.
L. W. Sandiforth, *G. Supt. & P. A.*.S. Norwalk, Ct.
N. M. George, *M. M. & C. B.*...Danbury, Conn.
Danville, Mocksville & So.-Wn. R. R. 3 g. 28 m.
H. W. Goodrich, *Ch. Eng.*....Leakesville, N. C.
Danville, Olney & O. R. R.R. 4-8½ g. 110 m. 4 lo. 83 c.
C. Howard, *G. Man. & Pur. Agt.*.Boston, Mass.
J. M. Graham, *Supt*....Kansas, Ill.
Louis Parisoe, *M. M & C. B.*....Kansas, Ill.
Dayton & Union R. R. (*See Ohio Ry.*)
Delaware, Lackawanna & Western R. R.
4-8½ g. 670 m. 348 lo. 26,187 cars.
Wm. F. Halstead, *Gen. Supt.*...Scranton, Pa.
G. W. B. Cushing, *Pur. Agt.* New York, N. Y
Walter Dawson, *Mast. of Mach.*..Scranton, Pa.
Robt. McKenna, *M. C. B*....Scranton, Pa.
Bloomsb'g Div.: C. Graham, *M. M.*.Kingston, Pa.
Utica Div.: A. C. Salisbury, *Supt*...Utica, N. Y.
Thos. Thatcher, *M. M*....Utica, N. Y.
Morris & Essex Div. and Sussex R. R.:
A. Reasoner, *Supt*....Hoboken, N. J.
W. H. Lewis, *M. M*.... Kingsland, N. J.
J. W. Baker, *Mast. Car Rep.*...Dover, N. J.
Oswego & Syracuse Div.:
W. B. Phelps, *Supt*....Oswego, N. Y.
Jas. Buchanan, *M. M.*.... Syracuse, N. Y.
Syracuse, Binghamton & New York R. R.
4-8½ g. 81 m. 20 lo. 598 cars.
W. K. Niver, *Gen. Supt*....Syracuse, N. Y.
Jas. Buchanan, *M. M.*....Syracuse, N. Y.
Delaware Western R. R. 4-8½ g. 20 m. 4 lo. 30 cars.
David Connell, *Supt*....Wilmington, Del.
Delaware & Chesapeake R. R. 4-8½ g. 54 m. 3 lo. 16 c.
O. S. Sanford, *Supt*....Oxford, Md.
Joseph A. Baynard, *M. M.*....Oxford, Md.
Chas. E. Mason, *M. C. B.*....Oxford, Md.
Delaware & Hudson Canal Co.
4-3 and 4-8½ g. 596 m. 151 lo. 9,248 cars.
C. F. Young, *Gen. Man*.... Honesdale, Pa.
C. F. Young, *Pur. Agt*....Albany, N. Y.
R. C. Blackall, *Supt. of Mach.*....Albany N. Y
Susq. Div.: C. D. Hammond, *Supt.* Albany, N. Y.
C. A. Jones, *M. M*....Oneonta, N. Y.
J. R. Skinner, *M. C. B.*....Oneonta, N. Y.
Sar. & Ch. Divs.: T. Voorhees, *Supt*...Troy, N. Y.
J. L. Corey, *M. M.*.... Green Island, N. Y.
Chr. Körner, *M. C. B.*.... Green Island, N. Y.
Pa. Div.: R. Manville, *Supt & Pur Agt.* and
S. H. Dotterer, *M. M.*....Carbondale, Pa.
T. Orchard, *M. C. B.*.... Carbondale, Pa.
Denver & Rio Grande Ry. 3 g. 1,062 m. 170 lo. 4,617 c.
D. C. Dodge, *Gen. Man*....Denver, Col.
Geo. W. Ristine, *Asst. Gen. Man.*..Denver, Col.
A. B. Garner, *Pur. Agt.*.Colorado Springs, Col
N. W. Sample, *M. M.*....Denver, Col.
Frank Howard, *M. C. B.*....Burnham, Col.
1st Div.: W. H. Bancroft, *Supt*...S. Pueblo, Col.
2d Div.: R. M. Ridgway, *Supt*.... Alamosa, Col.
3d Div.: Cole Lydon, *Supt*....Leadville, Col.
4th Div.: J. A. Myers, *Supt*.... Salida, Col.
Des Moines & Ft. Dodge. 4-8½ g. 87 m. 11 lo. 158 c.
C. N. Gilmore, *Supt*....Des Moines, Ia.
John McGrayel, *M. M.*....Grand Junction, Ia.
E. A. Avery, *M. C. B*....Grand Junction, Ia.
Det., Gr. H. & Mil. Ry. 4-8½ g. 189 m. 36 lo. 478 c.
G. R. Nash, *Gen. Man*....Detroit, Mich.
John S. Lorimer, *Storekeeper*...Detroit, Mich.
W. J. Morgan, *Supt*....Detroit, Mich.
F. Parker, *Mech. Supt*....Detroit, Mich.
Det., Lansing & No'n R. R. 4-8½ g. 222 m. 84 lo. 1027 c
John B. Mulliken, *Gen. Man*....Detroit, Mich.
Allan Bourn, *Pur. Agt*....Detroit, Mich.
Thos. M. Fish, *Gen. Supt*....Ionia, Mich.
G. C. Watrous, *M. M. & C. B*....Ionia, Mich.
Det., Mack. & Marq. R. R. 4-8½ g. 151 m. 8 lo. 227 c.
Thos. McKeown, *Gen. Supt*...Marquette, Mich.
E. W. Allen, *Pur. Agt*....Marquette, Mich.
John Wilson, *Mech. Supt*....Marquette, Mich.
Dorchester & Delaware R. R. 4-8½ g. 33 m.
Thos. E. Wright, *Supt*....Cambridge, Md.
Dubuque & Dakota R. R. 4-8½ g. 64 m. 2 lo. 54 cars.
A. C. Goodrich, *Supt*....Waverly, Ia.
W. S. Couch, *Pur. Agt*.... Dubuque, Ia.
Duck River Valley R. R. 3 g. 34 m.
Geo. Childress, *Supt*....Columbia, Tenn.
Dunkirk, Allegheny Valley & Pittsburgh R. R.
4-8½ g. 91 m. 14 lo. 102 cars.
D. Thayer, *Gen. Supt*....Dunkirk, N. Y.
R. C. Moore, *Pur. Agt*.... New York, N. Y.
J. C. Haggett *M. M. & C. B.*....Dunkirk, N. Y.

E

East Broad Top R. R. 3 g. 30 m. 6 lo. 191 cars.
A. W. Sims, *Supt*....Orbisonia, Pa.
G. A. Haggerty, *M. M.*....Orbisonia, Pa.
East Tennessee, Virginia & Georgia R. R.
5 g. 1,185 m. 133 lo. 1,597 cars.
Henry Fink, *Gen. Man.*....Lynchburg, Va.
J. F. O'Brien, *Gen. Supt*....Knoxville, Tenn.
Main Stem: Ohio: and No. Car. Divs.:
F. K. Huger, *Supt*....Knoxville, Tenn.
B. J. Sitton, *M. M.*....Knoxville, Tenn.
Jos. Armbruster, *M. C. B.*...Knoxville, Tenn.
Selma and Alabama Central Divs.:
John M. Bridges, *Supt*....Selma, Ala.
Simon Gay, *M. M.*....Selma, Ala.
W. W. Pierce, *M. C. B.*....Selma, Ala.
Memphis & Charleston R. R. (Div.):
R. B. Pegram, Jr., *Supt*.... Memphis, Tenn.
H. N. Burford, *M. M.*....Memphis, Tenn.
M. C. B.....Memphis, Tenn.
Macon & Brunswick Div.:
J. F. Mallory, *Supt*....Macon, Ga.
G. R. Wagnon, *M. M.*....Macon, Ga.
Georgia Division:
W. V. McCracken, *Supt*.... Atlanta, Ga.
Eastern R. R. 4-8½ g. 283 m. 90 lo. 2,268 cars.
D. W. Sanborn, *Mast. of Trans.*.Boston, Mass.
Geo. J. Fisher, *Pur. Agt*....Boston, Mass.
Amos Pillsbury, *S. M. P. & M.*..E. Boston, Mass.
J. D. Billings, *M. C. B.*....Salem, Mass.
Con'y Div.: J. W. Sanborn, *Supt.*, Wolfboro J., N. H.
Eastern Kentucky R. R. 4-8½ g. 34 m. 5 lo. 123 c.
H. W. Bates, *V. P. & Manager*...Greenup, Ky.
Geo. Gibbs, *Pur. Agt*....Riverton, Ky.
D. S. Weaver, *M. M.*....Riverton, Ky.
Eastern Shore R. R. 4-8½ g. 38 m. 2 lo.
W. Thompson, *Supt*....Princess Anne, Md.
F. Strattner, *M. M.*....Princess Anne, Md.
Elberton Air-Line R.R. (*See Rich. & Dan. N. G. Brs.*)
Elizabeth City & Norfolk R. R. 4-8½ g. 70 m. 5 lo. 96 c.
M. K. King, *Gen. Man. & Pur. Agt.*Norfolk, Va.
J. S. Whitworth, *M. M. & C. B*....Norfolk, Va.
Erie & Pittsburgh R. R. (*See Penna. Co.*)
Eureka & Palisade R. R. 3 g. 97 m. 7 lo. 124 cars.
P. Everts, *Gen. Supt & Pur. Agt.*.Eureka, Nev.
J. P. Rugg, *M. M.*....Palisade, Nev.
A. S. Longley, *M. C. B.*....Palisade, Nev.
Europ. & No. Amer. Ry. 4-8½ g. 114 m. 15 lo. 557 c.
F. W. Cram, *Supt. & Pur. Agt*....Bangor, Me.
A. O. Bailey, *M. M. & C. B.* Mattawamkeag, Me.

Evansville, Paducah & Cairo Line. 200 miles.
G. J. Grammer, *Supt*....Evansville, Ind.
Evansville, Rockport & E'n Ry. 4-9 g. 71 m. 5 lo. 98 c.
H. L. Shepard, *Supt*....Evansville, Ind.
Evansv. & Terre Haute. 4-8½ g. 114 m. 26 lo. 900 c.
C. J. Hepburn, *Gen. Supt*.... Evansville, Ind.
John Torrence, *Gen. For*....Evansville, Ind.

F

Fitchburg R. R.. 4-8½ g. 189 m. 100 lo. 3,315 cars.
John Adams, *Gen. Supt*....Boston, Mass.
E. K. Turner, *Asst. Supt*.... Fitchburg, Mass.
F. S. Pratt, *Pur. Agt*....Boston, Mass.
W. A. Foster, *Acting Supt. M. P. & M.*; and
J. W. Marden, *M. C. B*.... Charlestown, Mass.
Flint & Pere Marq. 4-8½ g. 318 m. 52 lo. 1,556 cars.
H. C. Potter, *Gen. Man*.... E. Saginaw, Mich.
D. Edwards, *Asst. Gen. Man.*.E. Saginaw, Mich.
G. G. Cook, *Pur. Agt*....E. Saginaw, Mich.
Sanford Keeler, *Gen. Supt.*.E. Saginaw, Mich.
W. F. Potter, *Supt.* (E. Div.)..E. Saginaw, Mich.
M. V. Meredith, *Supt.* (W. Div.)E. Saginaw, Mich.
T. J. Hatswell, *M. M*....E. Saginaw, Mich.
R. McPherson, *M. C. B*....E. Saginaw, Mich.
Florida Central & Western R. R.
5 g. 234 m. 16 lo. 160 cars.
Wm. M. Davidson, *Gen. Man.* Jacksonville, Fla.
J. P. Laird, *Supt*....Tallahassee, Fla.
Jas. S. McElroy, *M. M. & C. B.* Jacksonville, Fla.
Florida Southern Ry. 3 g. 50 m. 5 lo. 53 cars.
H. S. Ming, *Gen. Supt*....Palatka, Fla.
F. A. Garrison, *Pur. Agt*.... Palatka, Fla.
J. W. Roberts, *M. M. & C. B.*.... Palatka, Fla.
Florida Transit R. R. 5 g. 224 m.
D. E. Maxwell, *Gen. Supt*.... Fernandina, Fla.
John Hedges, *Pur. Agt*....Fernandina, Fla.
J. V. Webster, *M. M.*....Fernandina, Fla.
G. Hernandez, *M. C. B*.... Fernandina, Fla.
Fonda, Johnst'n & Gloversv. 4-8½ g. 26 m. 5 lo 18 c.
Lawton Caten, *Supt*....Gloversville, N. Y.
Fond du Lac, Amboy & Peoria. 3 g. 30 m. 2 lo. 35 c.
Alonzo Kinyon, *Supt. & P. A.* Fond du Lac, Wis.
Fort Dodge & Fort Ridley R. R. 4-8½ g.
G. R. Pearson, *Supt*....Fort Dodge, Ia.
Ft. Madison & No.-West'n Ry. 3 g. 41 m. 4 lo. 120 c.
S. B. Kenrick, *Supt. & Pur. Agt.* Ft. Madison, Ia.
L. Lamb, *M. M. & C. B.*....Ft. Madison, Ia.
Ft. Wayne, Cin. & Louisv. 4-8½ g. 108 m. 9 lo. 249 c.
White Water R. R 4-8½ g. 62 m. 5 lo. 170 cars.
W. W. Worthington, *Gen. Supt.* Ft. Wayne, Ind.
W. D. Morris, *M. M. & C. B.*.Ft. Wayne, Ind.
Ft. Wayne & Jackson. 4-8½ g. 100 m. 10 lo. 353 c.
Gen. Supt. & P. A.....Jackson, Mich.
C. W. Hollister *M. M. & C. B.*.. Jackson, Mich.
Fulton County N. G. Ry. 3 g. 47 m. 2 lo. 106 cars.
A. C. Atherton, *Gen. Supt. & P. Agt.* Lewiston, Ill.

G

Galveston, Harrisburg & San Antonio Ry.
4-8½ g. 492 m. 47 lo. 1870 cars.
Jas. Converse, *Gen. Supt.*....Houston, Tex.
Chas. Babbidge, *Pur. Agt*....Boston, Mass.
D. T. Davis, *Supt. M. P. & M.*.Harrisburg, Tex.
James Alexander, *M. C. B.*. Harrisburg, Tex.
El Paso Div. (*See Cen. Pac.*) 4-8½ g. 144 miles.
Galveston, Houston & Henderson R. R.
4-8½ g. 50 m. 17 lo. 212 cars.
W. H. Harding, *G. Man. & P. Agt.* Galveston, Tex.
Allen McCoy, *Supt*....Galveston, Tex.
J. G. Conlon, *M. M.*.... Galveston, Tex.
Geneva, Ithaca & Sayre R. R. (*See Lehigh Val.*)
Georgia R. R. 5 g. 307 m. 42 lo. 938 cars.
John W. Green, *Gen. Man*....Augusta, Ga.
John S. Cook, *M. M.*.... Augusta, Ga.
T. M. Preval, *M. C. B.*....Augusta, Ga.
Georgia Pacific Ry. (Miss. Div.). 3 g. 43 m. 2 lo. 44 c.
C. M. Bolton, *Supt*....Greenville, Miss.
W. M. Sutton, *Pur. Agt*....Greenville, Miss.
Benj. Davis, *M. M.*....Greenville, Miss.
J. B. Shelton, *M. C. B*.... Greenville, Miss.
Grand Haven R. R. (*See Chic. & W. Mich.*)
Grand Junction R'y. (*See Midland of Can.*)
G'd Rap., Newaygo & L. S. R. R. (*See Chic. & W. M.*)
Grand Rapids & Indiana. 4-8½ g. 456 m. 46 lo. 1,566 c.
W. O. Hughart, *Gen. Man.* Grand Rapids, Mich.
W. R. Shelby, *Pur. Agt*...Grand Rapids, Mich.
S. D. Bradley, *M. M.*.... Grand Rapids, Mich.
No'n Div.: J. M. Metheany, *Supt.* G'nd Rap., Mich.
So'n Div.: P. S. O'Rourke, *Supt.* Fort Wayne, Ind.
Grand Tower & Carbondale. 4-8½ g. 25 m. 6 lo. 357 c.
T. M. Williamson, *Supt. & P. A.* Gr. Tower, Ill.
Hugh Smith, *M. M. & C. B.*...Grand Tower, Ill.
Grand Trunk Ry. 4-8½ g. 1,267 m. 434 lo. 9,403 c.
Joseph Hickson, *Gen. Man.*....Montreal, Can.
Wm. Wainright, *Asst. Gen. Man.* Montreal, Can.
Gr. Tr. Divs.: W. J. Spicer, *Supt.* Montreal, Can.
Jno. Taylor, *Gen. Storekeeper.* Montreal, Can.
Herbert Wallis, *Mech. Supt*...Montreal, Can.
Wm. McWood, *M. C. B*.... Montreal, Can.
F. R. F. Brown, *Asst. M. S.*...Montreal, Can.
J. Davis Barnett, *Asst. M. S.*.Stratford, Ont.
Chi. & Gr. Trunk Ry. 4-8½ g. 330 m. 56 lo. 1,191 c.
S. R. Callaway, *Gen. Man*.... Chicago, Ill.
W. H. Pettibone, *Supt.*..Battle Creek, Mich.
N. Wall, *Pur. Agt*....Fort Gratiot, Mich.
H. Roberts, *Mech. Supt*...Port Huron, Mich.
Great Western Ry. 4-8½ g. 823 m. 216 lo. 5,039 c.
F. Broughton, *Gen. Man*....Hamilton, Ont.
Chas. Stiff, *Asst. Gen. Man.*....Hamilton, Ont.
John Burton, *Supt*....Hamilton, Ont.
E. R. Baines, *Pur. Agt*.... Hamilton, Ont.
C. K. Domville, *Loco. Supt*....Hamilton, Ont.
C. F. Hanson, *M. M.*....London, Ont.
Henry Childs, *Car Supt*....London, Ont.
Green Bay, Winona & St Paul R. R.
4-8½ g. 250 m. 19 lo. 599 cars.
Timothy Case, *V. P., Gen. Man.* Green Bay, Wis
James S. Mott, *Pur. Agt*....Green Bay, Wis.
A. Fenwick, *M. M.*.... Ft. Howard, Wis.
Gulf, Col. & Santa Fé Ry. 4-8½ g. 400 m. 32 lo. 1,000 c.
John Sealy, *Gen. Man*....Galveston, Texas.
F. P. Killeen, *Asst. Gen. Man. & Pur. Agt.* do.
G. B. Nichols, *M. M.*....Galveston, Texas.
W. H. Martin, *M. C. B*....Galveston, Texas.
Gulf, W'n Texas & Pac. Ry. 4-8½ g. 68 m. 6 lo. 70 c.
M. D. Monserrate, *Pr. & Supt*...Cuero, Texas.
James Mooney, *M. M.*....Cuero, Texas.

H

Halifax & Cape Breton Ry. 4-8½ g. 79 m. 5 lo. 237 c.
H. Abbott, *Manager*....New Glasgow, N. S.
Hannibal & St. Jo. R. R. 4-8½ g. 292 m. 76 lo. 1,860 c.
John B. Carson, *Gen. Man*....Hannibal, Mo.
W. R. Woodard, *Supt*....Hannibal, Mo.
T. L. Dunn, *Ch. Eng. & Pur. Agt.*.Hannibal, Mo.
Jas. Long, *Supt. M. P. & Car Dep.* Hannibal, Mo.
Hanover Junction, Hanover & Gettysburg R. R.
4-8½ g. 74 m. 9 lo. 106 cars.
H. D. Scott, *Gen. Supt*....Hanover, Pa.
John J. Bingley *M. M.*....Hanover, Pa.
Henry Britcher, *M. C. B*....Hanover, Pa.
Harrisburg & Potomac R. R. 4-8½ g. 27 m. 2 lo. 7 c.
R. H. Middleton, *Supt*....Boiling Springs, Pa.
Hartford & Conn. Val. R. R. 4-8½ g. 45 m. 7 lo. 196 c.
Samuel Babcock, *Pr. & Supt*....Hartford, Ct.
S. E. Brewer, *M. M.*....Hartford, Conn.
Hartford & Conn. W'n R. R. 4-8½ g. 69 m. 10 lo. 235 c.
John F. Jones, *Supt*....Hartford, Ct.
J. C. Barton, *M. M.*....Hartford, Ct.
Housatonic R. R. 4-8½ g. 126 m. 22 lo. 495 cars.
W. H. Yeomans, *Supt*....Bridgeport, Ct.
D. S. Draper, *Pur. Agt*....Bridgeport, Ct.
N. Slingland, *M. M*....Falls Village, Ct.
J. J. Ferris, *M. C. B*....Falls Village, Ct.
Houston Belt Ry 4-8½ and 3 gauge 50 miles.
S. L. Werden, *V. P. & Gen. Man.* Houston, Tex.
Houston, East & West Tex. Ry. 3 g. 109 m. 6 lo. 224 c.
Paul Bremond, *Pr. & Pur. Agt.*.Houston, Tex.
E. L. Bremond, *Gen. Man*....Houston, Tex.
A. Riggs, *M. M.*....Houston, Tex.
Houston & Tex. Cen. Ry. 4-8½ g. 701 m. 78 lo. 2,526 c.
G. Jordan, *V. Pr. & Gen. Man.*...Houston, Tex.
A. H. Swanson, *Gen. Supt*....Houston, Tex.
E. S. Larchar, *Pur. Agt*....New York, N. Y.
L. C. Noble, *Gen. M. M.*....Houston, Tex.
James McGee, *M. C. B.*....Houston, Tex.
So. & Wn. Divs.: M. G. Howe, *Supt.* Houston, Tex.
No. & Mi. Divs.: G. A. Quinlan, *Supt.*, and
C. H. Burns, *Asst. M. M.*....Corsicana, Tex.
No.-Wn. Div.: Donald Allen, *Supt*.... Waco, Tex.

Humeston & Shenandoah R. R.
4-8½ g. 85 m. 5 lo. 72 cars.
F. O. Wyatt, *Gen. Man*....Clarinda, Ia.
Huntingdon & Br. Top Mt. 4-8½ g. 62 m. 18 lo. 69 c.
Geo. F. Gage, *Gen. Supt*.... Huntingdon, Pa.
Samuel B. Knight, *Pur. Agt.*.Philadelphia, Pa.
William Barkla, *M. M.*....Saxton, Pa.

I

Illinois Central R. R. 4-8½ g. 1,554 m. 224 lo. 6,172 c.
E. T. Jeffery, *Gen. Supt*....Chicago, Ill.
C. A. Beck, *Asst. Gen. Supt*....Chicago, Ill.
O. Ott, *Pur. Agt*....Chicago, Ill.
S. J. Hayes, *Supt. of Mach*....Chicago, Ill.
W. B. Snow, *M. M. Car Works*....Chicago, Ill.
Chic. Div.: T. J. Hudson, *Supt*.... Cairo, Ill.
Henry Schlacks, *M. M*....Chicago, Ill.
Mid. Div.: H. L. Frisbie, *Supt*.... Pontiac, Ill.
Spring Div.: W. Wilkinson, *Supt.* Springfield, Ill
W. B. McKenna, *M. M.*....Clinton, Ill.
No'n Div.: J. C. Jacobs, *Supt*....Amboy, Ill.
J. B. Edams, *M. M.*....Amboy, Ill.
So. Div.: David Oxley, *M. M.*.... Centralia, Ill.
Ia. Div.: D. W. Parker, *Supt*.... Dubuque, Ia.
Thos. W. Place, *M. M.*....Waterloo, Ia.
Illinois Midland Ry. 4-8½ g. 176 m. 12 lo. 611 cars.
D. H. Conklin, *Rec. & Gen. Man.*....Decatur, Ill
E. D. Frost, *Gen. Supt*.... do.
J. G. Clifford, *M. M.*....Terre Haute, Ind.
Illinois & St. Louis R. R. 4-8½ g. 18 m. 5 lo. 402 c.
C. H. Sharman, *Gen Supt. & P. A* Belleville, Ill
E. Hockett, *M. M.*....Belleville, Ill.
Charles Rotha, *M. C. B*.... E. St. Louis Ill.
Indiana, Bloomington & Western Ry.
4-8¾ g. 712 m. 64 lo. 3,650 cars.
C. E. Henderson, *Gen. Man.* Indianapolis, Ind.
H. C. Norton, *Pur. Agt*.... Indianapolis, Ind.
B. Warren, *Gen M. M.*....Indianapolis, Ind.
Peoria Div.: I. H. Wilson, *Supt.*.Indianapolis, Ind.
E. Hiserodt, *M. M.*.... Urbana, Ill.
St. Louis Div.: I. H. Wilson, *Supt*....Indnpls, Ind.
John King, *M. M*....Indianapolis, Ind.
Ohio Div.: *Supt*....Sandusky, O.
Jos. S. Porter, *M. M.*....Sandusky, O.
Indiana, Illinois & Iowa R. R. 42 miles.
F. M. Drake, *Gen. Man*....Dwight, Ill.
J. P. Shouts, *Supt*....Dwight, Ill.
Ind'p'lis & St. Louis R. R. 266 m. 56 lo. 2,276 c.
C. C. Gale, *Gen. Supt*....Indianapolis, Ind
J. L. Yale, *Pur. Agt*....Cleveland, O.
T. W. Ransom, *M. M. & C. B*....Mattoon, Ill.
Indianapolis & Vincennes R. R. (*See Penna. Co.*)
Intercolonial Ry. 4-8½ g. 846 m. 111 lo. 3,223 cars.
David Pottinger, *Chief Supt*....Moncton, N. B.
T. V. Cooke, *Gen. Storekeeper*..Moncton, N. B.
H. A. Whitney, *Mech Supt*....Moncton, N. B.
Ewd. Shaffer, *M. C. B*.... Moncton, N. B.
Monc. Div.: James E. Price, *Supt.* Moncton, N. B.
Hal. & St. J. Div.: Jas. Coleman, *Supt.*.Truro, N. B.
No'n Div.: M. Busby, *Supt*....Cambellton, N. B.
Levis Div.: M. McDonald, *Supt.* Rivière du Loup, Q.
International Ry. 4-8½ g. 69 m. 2 lo. 12 cars.
D. E. McFee, *Supt*....Sherbrooke, Que.
International & Gt. N'n R. R. (*See St. L., I. M. & S.*)
Iron Mountain & Helena R. R. 4-8½ g. 27 m. 2 lo. 11 c.
Wm. Bailey, *Pres. & Gen. Man*.... Helena, Ark.
D. Stillinger, *Supt*....Helena, Ark.
F. M. Green, *Pur. Agt*....Helena, Ark.
Wm. Summers, *M. C. B*....Helena, Ark.
Ithaca, Auburn & Western R. R. 4-8½ g. 38 m.
Fred T. Peet, *Supt*....Auburn, N. Y.
Ira Dunning, *M. M.*....Auburn, N. Y.

J

Jacksonville So.-E'n R. R. 4-8½ g. 54 m. 5 lo. 68 c.
E. S. Greenleaf, *Supt*....Jacksonville, Ill.
Ira Petrie, *M. M.*....Jacksonville, Ill.
Jacksonv., Pensacola & Mob. (*See Fla. Cent. & W.*)
Jamesville & Washington. 4-8½ g. 22 m. 3 lo. 24 c.
A. Fisher, *Manager*....Dymond City, N. C.
J. E. Lordley, *M. M. & C. B.*.Dymond City, N. C.
Jeffersonv'l, Madison & Indpls. R. R. (*See Pa. Co.*)
Jersey City & Albany R. R. 4-8½ g. 38 m.
J. W. McCulloh, *Manager*...Jersey City, N. J.
Junction & Breakwater; Breakwater & Frankford; and Worcester R. Rs. 4-8½ g. 101 m. 6 l. 133 c.
J. & B. Rd.: Thos. Groome, *Supt*.... Lewes, Del.
Geo. Messick, *M. M.*....Lewes, Del.
W. H. Virden, *M. C. B*....Lewes, Del.
B. & F. and W. Rds.: J. L. Mapes, *St* Berlin, Md.

K

Kansas Central R. R. (*See Union Pacific.*)
Kansas City, Lawrence & So. Kansas.
C. C. Wheeler, *Gen. Man*.... Topeka, Kan.
J. L. Barnes, *Supt*....Lawrence, Kan.
T. D. Volk, *M. M.*....Ottawa, Kan.
Kansas City, Fort Scott & Gulf R. R. 4-8½ g.
Geo. H. Nettleton, *Gen. Man.*.Kansas City, Mo.
L. W. Towne, *Gen. Supt*.... Kansas City, Mo.
H. P. Jacques, *Pur. Agt*.... Kansas City, Mo.
J. L. Barnes, *Supt*....Kansas City, Mo.
J. S. McCrum, *M. M*....Kansas City, Mo.
A. N. Montier, *M. C. B.*....Kansas City, Mo.
Kansas City, St. Joseph & Council Bluffs; and St. Jo. & Des Moines R. Rs. 4-8½ g. 368m. 38 lo. 1,148 cars.
J. F. Barnard, *Gen. Supt. & P. A* St. Joseph, Mo.
F. A. Chase, *M. M.*.... St. Joseph, Mo.
Thos. Aylesbury, *M. C. B.*.... St. Joseph, Mo.
Kendall & Eldred R. R. (*See Olean, B. & W.*)
Kent Co.: Sm. & Del. Bay Rds. 4-8½ g. 50 m. 2 lo. 13 c.
Fred Gerker, *Gen. Man*....Chestertown, Md.
Kentucky Central R. R. 5 g. 148 m. 19 lo. 371 cars.
J. H. Setchel, *Supt*....Covington, Ky.
F. Allingham, *M. M.*....Covington, Ky.
J. L. Hackathorn, *M. C. B*....Covington, Ky.
Kentucky & South Atlantic Ry. 3 g. 23 m. 3 lo. 52 c.
Geo. B. Harper, *Supt. & P. A.*.Mt. Sterling, Ky.
S. P. Hatfield, *M. M.*....Mt. Sterling, Ky.
Kinzua R. R. (*See Olean, B. & W.*)
Kingston & Pembroke Ry. 4-8½ g. 65 m. 4 lo. 76 c.
B. W. Folger, *Supt*....Kingston, Ont.
Wm. Harty, *Pur. Agt*....Kingston, Ont.
Geo. Becker, *M. M*....Kingston, Ont.
Knox & Lincoln R. R. 4-8½ g. 49 m. 5 lo. 95 cars.
C. A. Coombs, *Supt*....Bath, Me.
Wm. A. Field, *M. M.*....Bath, Me.
C. L. Turner, *M. C. B*....Bath, Me.
Knoxville & Augusta R. R. 4-6 g. 16 m. 2 lo. 34 cars.
J. M. Hood, *Supt*....Marysville, Tenn.
M. R. Hood, *Pur. Agt*....Marysville, Tenn.

L

Lake Erie & Western Ry. 4-8½ g. 362 m. 35 l. 1,526 c.
E. H. Waldron, *Gen. Man*....La Fayette, Ind.
E. H. Andress, *Pur. Agt*....La Fayette Ind.
H. L. Cooper, *Supt. of Equipment*...Lima, O.
Sandusky Div.: D. S. Hill, *Supt*....Fremont, O.
Bloom. Div.: *Supt*...La Fayette, Ind.
Lake Shore & Michigan. So'n Ry.
4-8½ g. 1,243 m. 537 lo. 16,018 cars.
John Newell, *Gen. Man*.... Chicago, Il
P. P. Wright, *Gen. Supt*....Cleveland, O
A. C. Armstrong, *Pur. Agt*....Cleveland, O
James Sedgley, *Gen. M. M*....Cleveland, O.
John Kirby, *Gen. M. C. B.*....Cleveland, O.
Buffalo Div.: C. B. Couch, *Supt*....Cleveland, O.
J. S. Graham, *M. M*.... Buffalo, N. Y.
A. C. Robson, *M. C. B*....Buffalo, N. Y.
Frank. Div.: G. H. McIntire, *Supt.*.Stoneboro, Pa.
Erie Div.: C. B. Couch, *Supt*....Cleveland, O.
L. O. Gassett, *M. M.*....Cleveland, O.
J. Withycombe, *M. C. B.*....Cleveland, O.
Toledo Div.: Thos. Flesher, Jr., *Supt.* Cleveland, O.
J. M. Sanborn, *M. M*....Norwalk, O.
W. O. Smith, *M. C. B*....Norwalk, O.
Mich. Div.: J. E. Curtis, *Supt*.... Toledo, O.
Det. Div.: T. J. Charlesworth, *Supt.* Detroit, Mich.
Lansing Div.: W. H. Caniff, *Supt.*.Lansing, Mich.
Western Div.: J. H. Parsons, *Supt*... Chicago, Ill.
G. W. Stevens, *M. M.* (M. S. Divs.) Elkhart, Ind.
Frank O. Bray, *M. C. B*....Adrian, Mich.
Lebanon Springs R. R. 4-8½ g.
W. C. Alstyne, *Manager*.... Albany, N. Y.
J. K. Hotaling, *Pur. Agt*....Albany, N. Y.
Geo. Tefft, *M. M.*....Chatham, N. Y.

Lehigh Valley R. R. 4-8½ g. 545 m. 321 lo. 33,817 c.
Robt. H. Sayre, *Gen. Supt*....Bethlehem, Pa.
H. S. Goodwin, *Asst. Gen. Supt.* Bethlehem, Pa.
L. Chamberlain, *Pur. Agt*.... Philadelphia, Pa.
John S. Lentz, *M. C. B.*.... Packerton, Pa.
N. J. Div.: H. E. Packer, *Supt.*.New York, N. Y.
John I. Kinsey, *M. M.*....So. Easton, Pa.
Coal Rds.: J. I. Blakeslee, *Supt.* Mauch Chunk, Pa.
P. Hofecker, *M. M.*....Weatherly, Pa.
John Campbell, *M. M.*.... Delano, Pa.
B. M. Div.: A. G. Brodhead, *S.*.Mauch Chunk, Pa.
D. Clark, *M. M.*....Hazleton, Pa.
Wy. Div.: A. Mitchell, *S. & M. M.* Wilkesbarre, Pa.
Pa. & N. Y.; and Geneva, Ithaca & Sayre R. Rs.
Wm. Stevenson, *Supt*....Sayre, Pa.
J. N. Weaver, *M. M.*.... Waverley, Pa.
Ligonier Valley R. R. 3 g. 11 m. 2 lo. 22 cars.
Thos. A. Mellon, *Gen. Manager*.. Pittsburg, Pa.
Geo. Lenft, *Supt. & P. Agt*....Latrobe, Pa.
Little Rock, Miss. River & Texas Ry.
4-8½ g. 160 m. 12 lo. 260 cars.
J. A. Woodson, *G. S. & P. A.* Little Rock, Ark.
F. Hufsmith, *M. M. & C. B.* Arkansas City, Ark.
Little Rock & Fort Smith. 4-8½ g. 168 m. 12 lo. 353 c.
T. Hartman, *Gen. Supt*.... Little Rock, Ark.
James Eblin, *M. M.*....Argenta, Ark.
James Malone, *M. C. B.*....Argenta, Ark.
Long Island R. R. 4-8½ g. 325 m. 79 lo. 740 cars.
I. D. Barton, *Supt*.... Long Island City, N. Y
Benj. Norton, *Pur. Agt.*.Long Island City, N. Y
C. A. Thompson, *M. M. & C. B.* do.
Louisville, New Albany & Chicago Ry.
4-8½ g. 380 miles 33 lo. 2,800 cars.
John MacLeod, *Gen. Supt*....Louisville, Ky.
H. O. Nourse, *Pur. Agt*.... Louisville, Ky.
Josiah Beatis, *M. M. & C. B.*..New Albany, Ind.
Louis., Evans. & St. L. Ry. 4-8½ g. 254 m. 24 lo. 691 c.
Webster Snyder, *Gen. Man*....Louisville, Ky.
R. G Butler, *Gen. Supt*....Louisville, Ky.
C. F. Martin, *Pur. Agt.*....Louisville, Ky.
F. M. Mast, *M. M*....Evansville, Ind.
Louisville & Nashville R. R.
5 g. 2,072 m. 316 lo. 6,131 cars.
Fred. de Funiak, *Gen Man*....Louisville, Ky.
G. C. Breed, *A. Gen. Man. & Pur. Agt* do.
D. W. C. Rowland, *Gen. Supt. Trans.* do.
Reuben Wells, *Supt. Mach*.... Louisville, Ky
Louisv. Divs.; and Louisv., Cin. & Lex. Ry. (Cin. Div.)
J. G. Metcalf, *Supt*.... Louisville, Ky.
P. Leeds, *M. M.* (Lo. Div.).... Louisville, Ky.
J. W. Luttrell, *M. M.* (Cin. Div.) Louisville, Ky.
W. P. Pike, *M. M.* (2d & C. Div.) Bowling Green, Ky.
Nash. & D. Div.: J. Geddes, *Supt.* Nashville, Tenn.
W. H. Thomas, *M. M*.... Nashville, Tenn.
S. & N. A. Div.: E. Marsh, *Supt.* Birmingham, Ala.
C. W. White, *M. M.*....Birmingham, Ala.
Mob. & M.: N. Div. Pens. & Sel.; Sl. & Mont. R. Rs.:
M. S. Belknap, *Supt*....Montgomery, Ala.
J. N. Hall, *M. M.* (Mont. Shops). Montgomery, Ala.
N. O. Div.: J. T. Harrihan, *Supt.* New Orleans, La.
Wm. Adair, *M. M.*....Mobile, Ala.
Memp. Div.: W. Colcamp, *Supt.* Memphis, Tenn.
J. V. Slusser, *M. M.*....Memphis, Tenn.
St. L. Div.: J. Montgomery, *Supt.* Evansville, Ind.
Thos. Walsh, *M. M.*....Mt. Vernon, Ill.
Pensacola and So. Div. Pens. & Selma Rds.:
R. B. Small, *Supt*.... Pensacola, Fla.
Louisville & Wadley R. R. 5 g. 10 m.
J. H. Wilkins, *Pr. & Supt*....Louisville, Ga.

M

Maine Central R. R. 4-8½ g. 355 m. 58 lo. 1,335 c.
Payson Tucker, *Supt*....Portland, Me.
Ira K. Russell, *For. Mach. Sh.*. Waterville, Me.
C. H. Kenison, *For. Car Sh*....Augusta, Me.
Manchester & Keene R. R. (*See B. L. & C.*)
B. F. George, *Asst. Supt*....Keene, N. H.
Manhattan Ry. 4-8½ g. 32 m. 203 lo. 596 pass. c.
Frank K. Hain, *Gen. Man*....New York, N. Y.
James Tobin, *Pur. Agt*....New York, N. Y.
C. L. Green, *Supt*....New York, N. Y
T. W. Peeples, *M. M.*....New York, N. Y.
H. A. Webster, *M. C. B*....New York, N. Y.
Marietta & Cin. R. R. 4-8½ g. 312 m. 65 lo. 1,422 c.
Jas. H. Stewart, *Supt*.... Cincinnati, O.
Edw. Evans, *M. M*....Chillicothe, O.
Marietta & North Georgia R. R. 3 g. 24 m. 1 lo. 5 c.
J. B. Glover, *Supt & P. Agt*....Marietta, Ga.
E. A. Withers, *M. M.*....Marietta, Ga.
Marquette, Houghton & Ontonagon R. R.
4-8½ g 87 m. 30 lo. 2,074 cars.
Samuel Schoch, *Gen. Man*....Marquette, Mich.
R. M. McCauley, *Pur. Agt*...Marquette, Mich.
W. H. Williams, *M. M.*....Marquette, Mich.
H. D. Lyons, *M. C. B.*....Marquette, Mich.
Massachusetts Central R. R. 4-8½ g. 48 m.
N. C. Munson, *Gen. Man*....Boston, Mass.
E. G. Allen, *Supt. & P. A.*....Boston, Mass.
S. H. Munson, *Supt. M. P.*..So. Sudbury, Mass.
McKean & Buffalo R. R. 4-8½ g. 22 m. 2 lo. 8 cars.
S. G. Godden, *Supt*....Smethport, Pa.
Alex. White, *Pur. Agt*....Smethport, Pa.
Memphis & Charleston R. R. (*See E. Tenn. Va. & Ga.*)
Memphis & Lit. Rock R. R. 5 g. 135 m. 14 lo. 272 c.
E. K. Sibley, *G. Man. & P. A.*.Little Rock, Ark.
Wm. E. Smith, *Supt*....Memphis, Tenn.
Thos. Rennell, *M. M*....Argenta, Ark.
P. Twitchell, *M. C. B*....Argenta, Ark.
Mexican Central Ry.
Rudolph Fink, *Gen. Man*.... City of Mexico.
J. H. Garner, *Supt*....City of Mexico.
Howard Hinckley, *Pur. Agt*.... Boston, Mass.
F. W. Johnson, *M. M*....City of Mexico
J. H. O'Brien, *M. C. B*....City of Mexico.
Mexican National Ry. (*See Tex.-Mex.*
Michigan Cen. R. R. 4-8½ g. 958 m. 233 lo. 6,552 c
H. B. Ledyard, *Gen. Man*....Detroit, Mich
E. C. Brown, *Asst. Gen. Supt*...Jackson, Mich
Allan Bourn, *Pur. Agt*....Detroit, Mich
S. H. Edgerly, *Gen. M. M*....Jackson, Mich
Robert Miller, *Gen. M. C. B.*....Detroit, Mich
East Div.: D. S. Sutherland, *Supt.* Detroit, Mich
Bay City, Saginaw & Mackinaw Divisions.:
W. A. Vaughan, *Supt*....Bay City, Mich.
R. P. Baillie, *M. M*....Bay City, Mich.
Main Line: Gr. Rap.; So. Bend; and So. Hav. Divs.:
C. B. Bush, *Supt*.... Jackson, Mich.
W'n Divs.: R. H. L'Hommedieu, *Supt.* Chicago, Ill.
Middleburg & Schoharie; and
Schoharie Valley R. Rs. 4-8½ g. 10 m, 2 lo. 4 cars
S. S. Danforth, *Gen. Supt*... Middleburg, N. Y.
Midland of Canada. 4-8½ g. 143 m. 12 lo. 503 cars.
Geo. A. Cox, *Gen. Man*....Peterborough, Ont.
W. B. Ferguson, *Gen. Supt.* Peterborough, Ont.
C. H. Crofts, *Storekeeper*...Peterborough, Ont.
Wm. Marling, *Mech. Supt*....Port Hope, Ont.
Edward Douglas, *M. C. B*....Port Hope, Ont.
Wm. Polson, *M. M* (G. J. Ry.)...Belleville, Ont.
Victoria Div.: F. B. Polson, *M. M*...Lindsay, Ont.
H. H. Harry, *M. C. B*....Lindsay, Ont.
Toronto & Nipissing Div. 3-6 g. 105 m. 12 lo. 211 c.
J. Haggas, *M. M.*....Uxbridge, Ont.
Chas. E. Caron, *M. C. B.*....Uxbridge, Ont.
Midland No. Car. Ry. 4-8½ g. 95 m. 9 lo. 54 cars.
J. W. Andrews, *Gen. Man*.... Newbern, N. C.
Jno. P. Caddagan, *Pur. Agt*.... Newbern, N. C.
J. W. Andrews, *Supt*....Goldsboro, N. C.
B. Manly, *Supt. of Mach*....Newbern, N. C.
Milwaukee, Lake Shore & Western Ry.
4-8½ g. 250 m. 28 lo. 809 cars.
H. G. H. Reed, *Gen. Man. & P. Agt.* Milwaukee, Wis.
J. Donahue, *Supt*....Milwaukee, Wis.
Chas. S. Hayden, *Asst. Supt*...Manitowoc, Wis.
David B. Curtis, *Asst. Supt*.. Oshkosh, Wis
John Hickey, *M. M.*.... Manitowoc, Wis.
Milwaukee & Northern.
C. F. Dutton, *Gen. Supt*....Milwaukee, Wis.
Mineral Range R. R. 3 g. 13 m. 4 lo. 42 cars.
Chas. E. Holland, *Pr. & Supt*...Hancock, Mich.
W. H. Carr, *Pur. Agt*....Hancock, Mich.
T. J. Shellhorn, *M. M*.... Hancock, Mich.
C. Angie, *M. C. B.*....Hancock, Mich.
Minneapolis, Lyndale & Minnetonka Ry.
3 g. 20 m. 2 lo. 2 motors 39 cars.
Wm. McCrory, *Supt. & Pur. Agt.*. and
R. Curtis, *M. M.*....Minneapolis, Minn.

Minneapolis & St. L. Ry. 4-8½ g. 506 m. 60 lo. 1,850 c.
C. H. Hudson, Gen. Man ... Minneapolis, Minn.
E. B. Parke, Pur. Agt ... Minneapolis, Minn.
E. Ryder, Supt ... Minneapolis, Minn.
H. A. Towne, Supt. of Mach. Minneapolis, Minn.
Mississippi & Tenn. R. R. 5 g. 101 m. 11 lo. 194 c.
M. Burke, Supt ... Memphis, Tenn.
J. C. Ramsey, M. M ... Memphis, Tenn.
S. J. Bolton, M. C. B ... Memphis, Tenn.
Missouri Pacific Ry. 4-8½ g. 2,132 m. 293 lo. 8,035 c.
A. A. Talmage, Gen. Man ... St. Louis, Mo.
A. W. Dickinson, Asst. Gen. Supt. St. Louis, Mo.
R. B. Lyle, Pur. Agt ... St. Louis, Mo.
John Hewitt, Supt. Mach ... St. Louis, Mo.
John Hodge, Supt. Car Dep ... St. Louis, Mo.
Main Line, Warder Cumming, Supt. Sedalia, Mo.
C. L. Dunham, Supt. W'r ... Kansas City, Mo
Le Roy Bartlett, M. M ... St. Louis, Mo.
Geo. Walshe, M. M ... Sedalia, Mo.
Ks. & Tex. Div., J. M. Eddy, Supt ... Sedalia, Mo.
J. C. Barber, Asst. Supt. Car Dep. Sedalia, Mo.
Wm. T. Small, M. M ... Parsons, Kan.
Dallas, Ex., L. L. Keller, Supt ... Dallas, Tex.
Cen. Br. Div., W. W. Fagan, Supt. Atchison, Kan.
H. V. Faries, M. M ... Atchison, Kan.
S. Irwin, Asst. Supt. Car Dep. Atchison, Kan
Mobile & Ala. Grand Trunk R. R. 5 g. 59 m. 2 lo. 23 c.
Wm. H. Pratt, Trustee ... Mobile, Ala.
Mobile & Girard R. R. 5 g. 84 m. 5 lo. 80 cars.
W. L. Clark, Gen Supt ... Columbus, Ga.
J. C. Albrecht, M. M ... Columbus, Ga.
A. J. Nix, M. C. B ... Columbus, Ga.
Mobile & Ohio R. R. 5 g. 528 m. 75 lo. 1,180 cars.
A. L. Rives, V. Pr. & Gen. Man ... Mobile, Ala.
R. H. Briggs, Gen. M. M ... Whistler, Ala.
J. T. Booth, M. C. B ... Whistler, Ala.
So'n Div., I. G. Motley, Supt ... Mobile, Ala.
John Fitzgerald, M. M ... Macon, Miss.
No'n Div.: E. S. Horsford, Supt. Jackson, Tenn.
M. T. Carson, M. M ... Jackson, Tenn.
Mobile & Spring Hill R. R. 5 g. 8 m. 10 lo. 90 cars.
F. Ingate, Supt ... Mobile, Ala.
Mont Alto R. R. 4-9 g. 21 m. 2 lo. 3 cars.
G. B. Weistling, Supt. & P. A ... Mont Alto, Pa.
Montpelier & Wells Riv. R. R. 4-8½ g. 38 m. 3 lo. 76c.
Supt ... Montpelier, Vt.
Morgan's Louisiana & Tex. R. R. 4-8½ g. 165 m.
G. Pandeley, Supt ... New Orleans, La.
C. Trumpy, Pur. Agt ... New Orleans, La.
N. Tilton, M. M ... Algiers, La.
Wm. O'Brien, M. C. B ... Algiers, La.
Muncy Creek Ry. 4-8½ g. 10 m.
Benj. G. Welch, Rec. & P. Agt. Hughesville, Pa.
J. V. Chamberlain, Supt. & M. M. do.

N

Nashville, Chattanooga & St. Louis R'y.,
5 g. 508 miles 87 lo. 1,521 cars.
F. de Funiak, Gen. Man ... Louisville, Ky.
J. W. Thomas, G. Supt. & P. Agt. Nashville, Tenn.
M. J. C. Wrenne, Supt ... Nashville, Tenn.
James Cullen, M. M ... Nashville, Tenn.
J. G. Sawyer, M. C. B ... Nashville, Tenn.
Natchez, Jackson & Col. R. R. 3-6 g. 60 m. 4 lo. 32 c.
Belton Mickel, Supt ... Natchez, Miss.
Naugatuck R. R., 4-8½ g. 61 miles, 12 lo. 334 cars.
Geo. W. Beach, Supt ... Waterbury, Ct.
Henry Hanford, M. M ... Bridgeport, Ct.
Geo. W. Gray, M. C. B ... Bridgeport, Ct.
Nevada Central R. R. (See Union Pac.)
Nevada County N. G. R. R. 3 g. 23 m. 3 lo. 46 cars.
John F. Kidder, Supt ... Grass Valley, Cal.
Jas. McCormick, M. M. & C. B. Grass Valley, Cal.
New Brunswick Ry. 4-8½ g. 194 m. 12 lo. 266 cars.
E. R. Burpee, Supt ... Gibson, N. B.
Alfred Seely, Pur. Agt ... Gibson, N. B.
Jesse Mathews, M. M ... Gibson, N. B.
T. N. Burpee, M. C. B ... Gibson, N. B.
New Brunswick & Can. Ry. 4-8½ g. 127 m. 12 lo. 184c.
Henry Osborn, G. M. & P. A. St. Andrew's, N. B.
John Stewart, Supt ... St. Stephen, N. B.
Thos. Armstrong, M. M ... St. Andrew's, N. B.
G. Houlton, M. C. B ... St. Andrew's, N. B.
New Castle & Oil City R. R. 4-9 g. 38 m. 4 lo. 30 cars.
A. Vandiwort, Supt ... New Castle, Pa.
New Haven & Derby R. R. 4-8½ g. 13 m. 3 lo. 58 c.
E. S. Quintard, Supt ... New Haven, Conn.
J. M. Whitlock, M. M. & C. B. New Haven, Conn.
New Haven & No'mpton. 4-8½ g. 135 m. 26 lo. 572 c.
C. A. Goodnow, Supt ... New Haven, Ct.
C. N. Yeamans, Pur. Agt ... New Haven, Ct.
Henry Fox, M. M ... New Haven, Ct.
John Sweeny, M. C. B ... New Haven, Ct.
New Jersey & New York Ry. 6 g. 43 m. 6 lo. 40 c.
J. D. Hasbrouck, Gen. Man ... Jersey City, N. J.
J. S. Drake, Supt. & M. M ... Hillsdale, N. J.
L. B. Van Wagonen, M. C. B ... Hillsdale, N. J.
New Jersey Southern Ry. (See Central, N. J.)
New London Northern R. R (See Central Ver.)
New Orleans Pacific Ry. 5 g. 85 m. 10 lo. 206 cars.
H. S. Morse, Supt ... New Orleans, La.
E. R. Smith, M. M. & C. B ... New Orleans, La.
N. Y. Central & Hudson River R.R.
4-8½ g. 962 m. 676 lo. 22 539 cars.
J. M. Toucey, Gen. Supt ... New York, N. Y.
R. C. Moore, Pur. Agt ... New York, N. Y.
Wm. Buchanan, Supt. M. P ... New York, N. Y.
Amos Gould, Asst. Supt. M. P. New York, N. Y.
L. Garey, Supt. Car Dept ... New York, N. Y.
N. Y. & Har. Div.: C. M. Bissell, Supt. do.
P. McQ. Gibson, M. M ... New York, N. Y.
C. E. Garey, M. C. B ... Morrisania, N. Y.
Hud. Riv. Div.: C. M. Bissell, Supt. N. York, N. Y.
Peter Smith, M. C. B ... New York, N. Y.
E'n Div.: Zenas C. Priest, Supt ... Utica, N. Y.
G. B. Van Vorst, M. M ... West Albany, N. Y.
D. Hoit, M. C. B ... West Albany, N. Y.
W'n Div.: Geo. H. Burrows, Supt. Rochester, N. Y.
S. L. White, M. M ... Syracuse, N. Y.
E. A. Olmstead, M. C. B ... E. Buffalo, N. Y.
C. H. Burchard, M. C. B. E. Rochester, N. Y.
Rd. Donaby, M. C. B ... Niagara Falls, N. Y.
N. Y. Chic. & St. L. Ry. 4-8½ g. 269 m. 36 lo. 1,063c.
L. Williams, Gen. Man ... Cleveland, O.
H. L. Morrill, Gen. Supt ... Cleveland, O.
Eas'tn Div.: Wallace McGrath, Supt ... Erie, Pa.
Mid. Div.: C. H. Cory, Supt ... Fostoria, O.
West'n Div.: M. E. Wattles, Supt ... Chicago, Ill.
New York City & Northern. 4-8½ g. 52 m. 7 lo. 91 c.
F. S. Gannon, Gen. Supt ... High Bridge, N. Y.
M. McNally, M. of M ... High Bridge N. Y.
New York, Lake Erie & Western R. R.
4-8½ g. 1,020 m. 544 loco. 24,400 cars.
Robt. Harris, V. Pr. & G. Man. New York, N. Y.
E. S. Bowen, Gen. Supt ... New York, N. Y.
J. A. Hardenburg, Pur. Agt ... New York, N. Y.
F. M. Wilder, Supt. M. P. & M ... Susqueh'a, Pa.
E'n Div.: E. O. Hill, Supt ... Jersey City, N. J.
J. H. Vreeland, M. M ... Jersey City, N. J.
J. N. Mileham, M. C. B ... Jersey City, N. J.
Del. Div.: Chas. Neilson, Supt. Port Jervis, N. Y.
J. Van Vechten, M. M. & C. B. Pt. Jervis, N. Y.
Susq. Div.: R. B. Cable, Supt ... Elmira, N. Y.
V. Blackburn, M. M ... Susquehanna, Pa.
D. B. Goodell, M. C. B ... Elmira, N. Y.
Buf. & R. Divs.: C. W. Gardner, Supt.; and
G. B. Ross, M. M ... Buffalo, N. Y.
M. Wilder, M. C. B ... Buffalo, N. Y.
B. & S.-W. Div.: C. A. Brunn, Supt do.
W'n Div.: W. B. Coffin, Supt. Hornellsville, N. Y.
E. H. Griggs, M. M ... Hornellsville, N. Y.
New York, New Haven & Hartford R. R.
4-8½ g. 203 m. 102 lo. 2,416 cars.
E. M. Reed, V. P. & Gen. Man. New Haven, Ct.
R. N. Dowd, Pur. Agt ... New Haven, Ct.
N. Y. & N. H. Div.: J. T. Moody, Supt. New York.
Shore Div.: W. H. Stevenson, Supt. N. Haven, Ct.
H. Kettendorf, Supt. M. P ... New Haven, Ct.
Jas. Denver, M. C. B ... New Haven, Ct.
Hart. Div.: C. S. Davidson, Supt ... Hartford, Ct.
John Henny, Jr., Supt. M.P. & M. C. B ... do.
New York, Ontario & Western Ry.
4-8½ g. 345 m. 79 lo. 1,539 cars.
Jas. E. Childs, Gen. Supt ... Middletown, N. Y.
I. W. Fowler, Pur. Agt ... Middletown, N. Y.
Edw. Minshull, M. M. & C. B. Middletown, N. Y.
Mid. Div.: N. R. Hankins, Supt. Middletown, N. Y.
No'n Div.: C. W. Lanpher, Supt ... Norwich, N. Y.
New York, Pennsylvania & Ohio R. R.
4-8½ g. 564 m. 215 lo. 7,387 cars.
P. D. Cooper, Gen. Man ... Cleveland, Ohio.
J. M. Ferris, Supt. Trans ... Cleveland, Ohio.
J. H. Holway, Pur. Agt ... Cleveland, Ohio.
Wm. Fuller, Gen. M. M. & C. B ... Cleveland, O.
S. V. Smith, Asst. Gen. M. C. B ... Kent, Ohio.
E'n Div.: A. L. Dunbar, Supt ... Meadville, Pa.
J. A. Cooper, M. M ... Meadville, Pa.
D. S. Dockstader, M. C. B ... Meadville, Pa.
J. F. Fosdick, For. Car Rep. Salamanca, N. Y.
W'n Div.: J. W. Alsop, Supt ... Galion, O.
Wm Hill, M. M ... Galion, O.
J. W. Holmes, For. Car Rep ... Galion, O.
Geo. Wilson, For. Car Rep ... Dayton, Ohio.
Maho'g Div.: N. F. Wood, Asst. Supt. Cleveland, O.
N. Wright, M. M ... Cleveland, O.
C. N. Thorp, M. C. B ... Cleveland, O.
New York, Providence & Boston R. R.
4-8½ g. 72 m. 29 lo. 430 cars.
J. B. Gardner, Supt ... Providence, R. I.
Giles F. Ward, Pur. Agt ... Stonington, Conn.
J. H. Anderson, M. M. & C. B. Providence, R. I.
N. Y., Susquehanna & W'n. 4-9 g. 86 m. 20 lo. 350 c.
H. M. Britton, Gen. M. & P. A. New York, N. Y.
W. C. Ennis, M. M. & C. B ... Wortendyke, N. J.
New York, West Shore & Buffalo Ry.
Chas. Paine, Gen. Man ... New York, N. Y.
Howard Fry, Supt. M. P ... New York, N. Y.
New York, Woodhaven & Rockaway R. R.
4-8½ g. 26 m. 8 lo. 101 cars.
J. M. Lunt, Supt. & P. Agt. Hunter's Pt., L. I.
W. B. Turner, M. M ... Hunter's Point, L. I.
N. Y. & Greenwood Lake Ry. 4-8½ g. 42 m. 8 lo. 53 c.
J. H. Tinney, Acting Supt ... Jersey City, N. J.
J. A. Hardenburg, Pur. Agt. Jersey City, N. J.
G. A. Hill, M. M ... Pompton, N. J.
N. Y. & Manhattan Beach Ry. 3 g. 23 m. 12 lo. 128 c.
D. C. Corbin, Man. Dir ... New York, N. Y.
O. Fairhurst, M. M ... Greenpoint, L. I.
New York & New England R. R.
4-8½ g. 463 m. 127 lo. 3,326 cars.
S. M. Felton, Jr., Gen. Man ... Boston, Mass.
W. W. McKim, Pur. Agt ... Boston, Mass.
A. K. Mansfield, Supt. M. P ... Boston, Mass.
Elias E. Pratt, M. C. B ... Norwood, Mass.
Nor. Div.: P. St. M. Andrews, Supt ... Norwich, Ct.
Richard Colburn, M. M ... Norwich, Ct.
Prov. Div.: L. W. Palmer, Supt. Providence, R. I.
Hfd. Div.: T. W. Kennan, Supt ... Hartford, Ct.
E. M. Humstone, M. M ... Hartford, Ct.
Newburg, Dutchess & Conn. R. R. 4-8½ g. 58 miles.
C. L. Kimball, Gen. Supt ... Mattewan, N. Y.
W. G. Van Buskirk, M. M. & C. B. do
Norfolk & Western R. R. 5 g. 428 m. 82 lo. 1,220 c.
Henry Fink, 2d V. Pr. & Gen. Man. Lynchb'g, Va.
W. C. De Armond, Pur. Agt ... Philadelphia, Pa.
C. Blackwell, Supt. M. P ... Roanoke, Va.
Va. & Tenn. Div.: F. Sterk, M. M. Lynchburg, Va.
Frank Huger, Supt ... Lynchburg, Va.
W. A. Morgan, M. C. B ... Lynchburg, Va.
Nor. & Pt. Div.: N. M. Osborne, Supt.,
J. T. Robinett, M. M. & C. B. Petersburg, Va.
North-Eastern R. R. of Ga. 5 g. 40 m. 2 lo. 18 cars.
H. R. Bernard, Supt ... Athens, Ga.
Jno. J. Longest, M. C. B ... Athens, Ga.
North-Eastern R. R. (S. C.) (See Wil. & Wel.
North Pacific Coast R. R. 3 g. 80 m. 12 lo. 316 cars.
David Nye, Gen. Supt ... San Rafael, Cal.
W. F. Russell, Pur. Agt ... San Francisco, Cal.
J. Fowler, M. M ... Sancelito Cal.
North Shore
A. Davis, Gen. Man ... Montreal, Can.
Northern (N. H.), and Concord & Claremont Rys.
4-8½ g. 173 m. 25 lo. 569 cars.
Geo. E. Todd, Supt ... Concord, N. H.
Ed. Studley, M. M. & C. B. & Pur. Agt do.
Northern (N. J.) R. R. (See N. Y., L. E. & W'n.)
Northern Central Ry. (See Penna. (R. R.)
North'n Pacific R. R. 4-8½ g. 1,193 m. 104 lo. 3,089 c.
Herman Haupt, Gen. Man ... St. Paul, Minn.
John H. Ames, Pur. Agt ... St. Paul, Minn.
Geo. W. Cross, Supt. Trans ... St. Paul Minn.
Geo. W. Cushing, Supt. M. P. & M. St. Paul, Minn.
W. J. Brokaw, M. M ... Forsyth, Mon.
St. P. & Minn. Divs.: B. McHugh, Supt., do.
H. J. Small, Supt. Mach ... Brainerd, Minn.
Dakota Div.: C. T. Hobart, Supt ... Fargo, Dak.
A. Rupert, M. M ... Fargo, Dak.
Mo. Div.: D. R. Taylor, Supt ... Mandan, Dak.
E. F. Doran, M. M ... Mandan, Dak.
Yell'st'e Div.: S. R. Ainslie, Supt. Glendive, Mont.
S. L. Bean, M. M ... do
(2) Western Div.: J. W. Sprague, Gen Supt.; and
Otis Sprague, Supt ... New Tacoma, W. T.
H. D. Sanborn, Pur. Agt ... Portland, Ore.
F. C. Ford, M. M ... New Tacoma, W. T.
S. Wishart, M. C. B ... New Tacoma, W. T.
Pend d'Ore Div.: H. W. Fairweather, Supt.; and
J. F. Curtis, M. M ... Ainsworth, W. T.
Northern & North-W'n Ry. 5-6 & 4-8½ g. 50 lo. 1,033 c.
James Webster, Supt ... Toronto, Can.
C. W. Postlethwaite, Pur. Agt ... Toronto, Can.
P. Clarke, M. M ... Toronto, Can.

O

Ogdensburg & Lake Champlain R. R.
4-8½ g. 122 m. 33 lo. 1,160 cars.
A. A. Gaddis, Gen. Man ... Malone, N. Y.
Abr. Klohs, Supt. & M. M ... Malone, N. Y.
Ohio Central R. R. 4-8½ g. 230 m. 30 lo. 3,201 cars.
John E. Martin, Gen. Man ... Toledo, O.
John E. Martin, Gen Supt ... Toledo, O.
W. H. Vandegrift, Supt ... Toledo, O.
F. W. Stewart, Pur. Agt ... Toledo, O.
J. B. Morgan, M. M. & C. B ... Bucyrus, O.
Ohio Southern. 4-8½ g. 119 m. 19 lo. 623 cars.
Ford Woods, Supt ... Springfield, O.
H. C. Norton, Pur. Agt ... Indianapolis, Ind.
W. B. Warren, M. M ... Springfield, O.
Ohio & Mississippi Ry. 4-9 g. 615 m. 14 lo. 2,501 cars.
W. W. Peabody, Gen. Supt ... Cincinnati, O.
G. E. Atwood, Pur. Agt ... Cincinnati, O.
Cin. Div.: C. B. Cole, Supt ... Seymour, Ind.
John Thumser, M. M ... Seymour, Ind.
J. P. Coulter, M. C. B ... Aurora, Ind.
Arthur Donaldson, M. M ... Vincennes, Ind.
St. L. & Sp. Div.: C. M. Stanton, Supt. St. Louis, Mo.
J. W. Stokes, M. M. (Spring. Div.) ... Pana, Ill.
Louisv. Div.: C. B. Cole, Supt ... Louisville, Ky.
Oil City & Ridgway R. R. 4-8½ g. 6 m. 1 lo. 43 cars.
A. F. Kent, Gen. Man ... Oil City, Pa.
Old Colony R. R. 4-8½ g. 463 m. 110 lo. 2,862 cars.
J. R. Kendrick, Gen Supt ... Boston, Mass.
Main Li. Div.: J. H. French, Supt ... Boston, Mass.
R. W. Husted, Pur. Agt ... Boston, Mass.
J. K. Taylor, M. M ... Boston, Mass.
A. Gleason, M. C. B ... Boston, Mass.
Cape Cod Div.: C. H. Nye, Supt ... Hyannis, Mass.
No. Div.: S. A. Webber, Supt ... Fitchburg, Mass.
George W. Reynolds, M. M ... Taunton, Mass.
Sam. Stevens, M. C. B ... Taunton, Mass.
Olean, Bradford & Warren; Bradford; Kinzua; and
Kendall & Eldred R. Rs. 3 g. 38 m. 9 lo. 222 cars.
J. W. Watson, Gen. Supt ... Olean, N. Y.
J. H. Poole, Pur. Agt ... Buffalo, N. Y.
Charles Turner, M. M. & C. B ... Olean, N. Y.
Ontario Southern Ry. 4-8½ g. 24 m. 3 lo. 40 c.
S. B. Stuart, Supt ... Sodus Point, N. Y.
S. B. Stuart, Pur. Agt ... Sodus Point, N. Y.
W. H. Cook, M. C. B ... Sodus Point, N. Y.
Oregon Ry. & Nav. Co. 4 8-½ g. 225 m. 31 lo. 930 cars.
C. H. Prescott, Manager ... Portland, Ore.
J. M. Buckley, Asst. Man. & Act. Supt. do.
J. M. Fillmore, Supt. (R. Div.) ... Portland, Ore.
K. Von Oterendorf, Supt. (O. Div.) S. F'cisco, Cal.
J. M. Drake, Pur. Agt ... Portland, Ore.
C. C. Hobart, Gen. M. M ... The Dalles, Ore.
Chas. A. Phipps, M. C. B ... The Dalles, Ore.
N. G. Div.: Wm. Reed, Man ... Portland, Ore.
James Walch, M. M ... Portland, Ore.
Oregon & California R. R. 4-8½ g. 200 m. 14 lo. 286 c.
R. Koehler, Act. Man ... Portland, Ore.
J. Brandt, Gen. Supt ... Portland, Ore.
A. Brandt, M. M ... Portland, Ore.
Owensboro & Nashville R. R. 5 g. 35 m.
W. L. Gude, Gen. Supt ... Owensboro, Ky.
H. M. Gable, M. M. & C. B ... Owensboro, Ky.

P

Paducah & Elizabetht'n R.R. 5 g. 186 m. 19 lo. 536 c.
Robert Meek, Gen. Supt ... Elizabethtown, Ky.
W. D. Robb, M. M. & C. B. Elizabethtown, Ky.
Painesville & Youngstown R. R. 3 g. 65 m. 7 lo. 319 c.
E. K. Hyndman, Gen. Man ... Pittsburg, Pa.
J. A. Newcome, Supt ... Painesville, O.
J. H. Jones, M. M ... Painesville O.
Panama R. R. 5 g. 58 m. 14 lo. 534 cars.
H. A. Woods, Supt ... Aspinwall, U. S. Col.
E. Z. Penfield, Pur. Agt ... New York, N. Y.
Thomas S. O'Brien, M. M. Aspinwall, U. S. Col.
Parker & Karns City; and
Karns City & Butler R. Rs. 3 g. 27 m. 5 lo. 84 cars.
W. C. Moberly Gen. Supt ... Parker City, Pa.
Philip Davies, M. M ... Parker City, Pa.
Wm. Wolford, M. C. B ... Parker City, Pa.
Passumpsic R. R. 4-8½ g. 165 m. 28 lo. 105 cars.
E. Raymond, Pres. & Pur. Agt. Boston, Mass.
H. E. Folsom, Supt ... Lyndonville, Vt.
L. L. Brigham, M. M ... Lyndonville, Vt.
L. F. Woodard, M. C. B ... Lyndonville, Vt.
Peach Bottom R. R. 3 g. 55 m. 6 lo. 52 cars.
Supt. & Pur. Agt ... York, Pa.
E. H. Williams, M. C. B ... York, Pa.
E. Div.: S. Dickey, Supt ... Oxford, Pa.
G. R. Dickey, Pur. Agt ... Oxford, Pa.
W. P. Kirk, M. M ... Oxford, Pa.
Pennsylvania Co.'s (9) Roads.
4-9 g. 2,838 m. 817 lo. 29,432 cars.
Wm. Mullins, Gen. Pur. Agt ... Pittsburg, Pa.
Joseph Wood, Supt. M. P ... Fort Wayne, Ind.
(1) Clev. & Pittsb'g R. R. 4-9 g. 224 m. 97 lo. 3,336 c.
R. V. Smith, Asst. Gen. Man ... Cleveland, O.
Philip Bruner, Supt ... Wellsville, O.
W. F. Beardsley, Mast. of Mach. Cleveland, O.
(2 & 3) Erie & Ashtabula Rds. 178 m. 29 lo. 1,340 c.
John M. Kimball, Supt ... Youngstown, O.
J. A. Wood, For. Shops ... Erie, Pa.
(4) Indianap. & Vincennes Rd. 117 m. 11 lo. 303 cars.
Jas. J. Turner, Supt ... Indianapolis, Ind.
M. M.
(5) Jeffersonville, Madison & Indianapolis R. R.
4-9 g. 217 m. 47 lo. 784 cars.
E. W. McKenna, Supt ... Louisville, Ky.
Wm. Swanston, M. M ... Jeffersonville, Ind.
Edw. Austin, M. C. B ... Jeffersonville, Ind.
(6) Northwestern Ohio Ry. 4-9 g. 79 m.
J. S. Morris, Supt ... Toledo, O.
(7) Pittsburg, Ft. Wayne & Chicago Ry.
4-9 g. 468 m. 278 lo. 6,782 cars.
E'n Div.: A. B. Starr, Supt ... Allegheny, Pa.
Geo. J. Parkin, M. M ... Allegheny, Pa.
W'n Div.: C. D. Law, Supt ... Ft. Wayne, Ind.
F. D. Casanave, M. M ... Ft. Wayne, Ind.
(8) Pittsburg, Cincinnati & St. Louis Ry.
4-9 g. 1,172 m. 336 lo. 6,482 cars.
Jas. McCrea, Gen. Supt ... Columbus, O.
R. H. Soule, Supt M. P. & M ... Columbus, O.
P. & Col. Div.: E. B. Taylor, Supt. Dennison, O.
Ross Kells, M. M ... Dennison, O.
A. K. Mansfield, M. C. B ... Steubenville, O.
Robt. Curtis, M. M ... Columbus, O.
Thos. Chamberlain, M. C. B ... Columbus, O.
C. & M. V. Div.: W. F. Black, Supt. Zanesville, O.
Leroy Kells, M. M ... Lancaster, O.
Daniel Jewell, M. C. B ... Lancaster, O.
Li. Mi. Div.: Ralph Peters, Supt ... Cincinnati, O.
Leroy Kells, M. M ... Cincinnati, O.
M. P. Ford, M. C. B ... Columbus, O.
Ind. Divs.: J. F. Miller, Supt ... Richmond, Ind.
Geo. H. Prescott, M. M ... Logansport, Ind.
Chas. H. Starr, M. C. B ... Logansport, Ind.
M. J. Rogers, M. M ... Indianapolis, Ind.
Chi. Div.: C. C. F. Bent, Supt ... Logansport, Ind.
(9) Terre Haute & Indianapolis R. R.
4-9 g. 374 m. 83 lo. 2,868 cars.
Joseph Hill, Gen. Supt ... St. Louis, Mo.
C. R. Peddle, P. Agt. & Supt. M. P. & M.; and
E. D. Carter, M. C. B ... Terre Haute, Ind.
Clinton Idler, M. M ... Indianapolis, Ind.
Chas. Butler, M. M ... Effingham, Ill.
A. W. Quakenbush, M. M ... Logansport, Ind.
Pennsylvania R. R. Co.'s Roads. (7 Gen. Divs.)
4-9 g. 2,704 m. 1,271 loco. 51,894 cars.
Frank Thomson, Gen Man ... Philadelphia, Pa.
Enoch Lewis, Pur. Agt ... Philadelphia, Pa.
John Reilly, Supt. Trans ... Philadelphia, Pa.
T. N. Ely, Supt. Mo. Po. (4 Gen. Divs.) Altoona, Pa.
(1) Pennsylvania R. R. Divs.
4-9 g. 1,105 m. 627 lo. 35,583 cars.
Charles E Pugh, Gen Supt ... Altoona, Pa
Phila. Div.: S. M. Prevost, Supt. Philadelphia, Pa.
H. D. Garrett, M. M ... W. Philadelphia, Pa.
I. W. Van Houten, M. C. B ... W. Phila., Pa.
Mid. Div.: H. H. Carter, Supt ... Harrisburg, Pa.
E. L. Caum, M. M ... Harrisburg, Pa.
Samuel W. Myers, M. C. B ... Harrisburg, Pa.
Alt'a Div.: Wm. J. Latta, Supt ... Altoona, Pa.
G. W. Strattan, M. M ... Altoona, Pa.
John P. Levan, M. C. B ... Altoona, Pa.
Pitts. Div.: Robert Pitcairn, Supt ... Pittsburg, Pa.
D. O. Shaver, M. M ... Pittsburg, Pa.
J. G. Stewart, M. C. B ... Pittsburg, Pa.
W. Pa. Div.: A. P. Kirtland, Supt. Blairsville, Pa.
C. B. Street, M. M ... Blairsville, Pa.
M. H. Fails, M. C. B ... Blairsville, Pa
Fred. Div.: J. B. Hutchinson, Supt ... York, Pa
Tyrone Div.: S. S. Blair, Supt ... Tyrone, Pa.
Lew. Div.: Wm. M. Phillips, Supt. Lewistown, Pa.
Bed. Div.: Thos. A. Roberts, Supt ... Bedford, Pa.
Monong. Div.: David M. Watt, Supt. Pittsburg, Pa.
Wm. Lininger, M. M ... Pittsburg, Pa
(2) United R. Rs. of N. J. Divs. 414 m. 257 lo. 4,668 c.
F. Wolcott Jackson, Gen. St. Jersey City, N. J.
N. Y. Div.: Robt. E. Pettit, Supt. Jersey City, N. J.
H. S. Hayward, At. St. M. P. Jersey City, N. J.
David H. Baker, M. C. B ... Jersey City, N. J.
L. A. Bosdevex, M. M ... Jersey City, N. J.
E. F. Bosdevex, M. C. B ... Jersey City, N. J.
Belv. Div.: J. A. Anderson, Supt. Lambertv., N. J.
R. McDowell, M. M ... Lambertville, N. J.
Amboy Div.: J. S. Buckalew, Supt. Camden, N. J.
Thos. Kerr, M. M ... So. Amboy, N. J
P. S. Bogart, M. C. B ... So. Amboy, N. J
(3) West Jersey R. R. 4-9 g. 163 m. 22 lo. 342 cars
Joseph Crawford, Supt ... Camden, N. J
W. McAllister, M. M ... Camden, N. J
C. C. Williams, M. C. B ... Camden, N. J
(4) Phila., Wilm. & Balt. R.R. 212 m. 86 lo. 1,488 c.
H. F. Kenney, Gen. Supt ... Philadelphia, Pa.
S. A. Hodgman, M. M ... Wilmington, Del.
Wm. Lundgren, M. C. B ... Wilmington, Del.
Cen. Div.: L. K. Lodge, Supt ... Philadelphia, Pa.
S. D. Danfield, M. M. & C. B ... Chester, Pa.
Del. Div.: I. N. Mills, Supt ... Philadelphia, Pa.
(5) Phila. & Erie R. R. Divs.: 376 m. 117 lo. 3,481 c.
R. Neilson, Gen Supt ... Williamsport, Pa.
A. O. Dayton, Supt. Mo. Po ... Williamsport, Pa.
E'n. Div.: Thos. Gucker, Supt. Williamsport, Pa.
Sun. H. & W. Div: F. L. Sheppard, Supt.; and
W. F. Beardsley, M. M ... Sunbury, Pa.
Mid. Div.: E. B. Westfall, Supt ... Renova, Pa.
Wm. L. Holman, M. M ... Renova, Pa.
West'n Div.: J. W. Reynolds, Supt ... Erie, Pa.
W. T. Smith, M. M ... Erie, Pa.
(6) Northern Central Ry. 4-9 g. 326 m. 152 lo. 6,163 c.
A. W. Sumner, Pur. Agt ... Baltimore, Md.
Susq., Shamokin, Elmira & Canandaigua Divs.:
Robert Neilson, Gen. Supt ... Williamsport, Pa.
A. O. Dayton, Supt. M. P ... Williamsport, Pa.
Susq. Div.: Thos. Gucker, Supt. Williamsport, Pa.
Sham. Div.: Supt ... Sunbury, Pa.
Elm. & Can. Divs.: S. Meade, Supt. Elmira, N. Y.
Jas. Strode, M. M ... Elmira, N. Y.
J. C. Dyott, M. C. B ... Elmira, N. Y.
Baltimore Divs. of Northern Central; and
(7) Baltimore & Potomac R. R. 128 m. 29 lo. 356 c.
G. C. Wilkins, Supt ... Baltimore, Md.
A. W. Sumner, Pur. Agt ... Baltimore, Md.
J. M. Wallis, Supt. Mo. Po ... Baltimore, Md.
J. M. Coale, M. M ... Baltimore, Md.
G. W. Demarest, M. C. B ... Baltimore, Md.
Penn. Coal Co.'s R. R. 4-3 g. 67 m. 23 eng. 2,871 c.
J. B. Smith, Gen. Supt ... Dunmore, Pa.
And. Crane, M. M ... Dunmore, Pa.
Geo. W. Simpson, M. C. B ... Dunmore, Pa.
Pennsylvania & Erie R. R.—Early Branch.
C. R. Early, Gen. Supt ... Ridgeway, Pa.
Pensacola & Perdido R. R. 6 g. 8 m. 5 lo. 73 cars.
B. F. Simmons, Pr. & Supt ... Pensacola, Fla.
H. W. Simmons, Pur. Agt ... Pensacola, Fla.
R. G. Nicholl, M. M. & C. B ... Pensacola, Fla.
Peoria, Decatur & Evansville Ry.
4-8½ g. 215 m. 12 lo. 725 cars.
G. L. Bradbury, Gen. Man ... Peoria, Ill.
Supt. & Pur. Agt ... Peoria, Ill.
P. Reilly, M. M ... Mattoon, Ill.
Peoria & Farmington R. R. 4-8½ g. 25 m. 2 lo. 25 c.
D. P. Phelps, Gen. Man ... Monmouth, Ill.
John F. Wallace, Supt ... Farmington, Ill.
Peoria & Pekin Union Ry. 4-8½ g. 20 m. 12 lo. 100 c.
Thos. B. Burnett, Gen. Supt. & P. A. Peoria, Ill.
R. F. Hurd, M. M. & C. B ... Peoria, Ill.
Perkiomen R. R. 4-8½ gauge 39 miles.
D. B. Clack, Supt ... Norristown, Pa.
Petersburg R. R. 4-8½ g. 64 m. 10 lo. 131 cars
R. M. Sully, Gen. Supt ... Petersburg, Va.
L. E. Clark, Pur. Agt ... Petersburg, Va.
R. B. Andrews, M. M ... Petersburg, Va.
J. W. Fleming, M. C. B ... Petersburg, Va.
Phila., Wilmington & Balt. R. R. (See Penna. R. R.)
Phila. & Atlantic City Ry. 3-6 g. 65 m. 11 lo. 134 cars.
F. S. Urie, Supt. & Pur. Agt. Philadelphia, Pa.
J. W. Wright, M. M ... Camden, N. J.
E. Lippincott, M. C. B ... Camden, N. J.
Phila. & Reading. 4-8½ g. 869 m. 516 lo. 21,960 cars.
John E. Wootten, Gen. Man. Philadelphia, Pa.
W. S. Wilson, Pur. Agt ... Philadelphia, Pa.
Geo. Eltz, Supt. Trans ... Reading, Pa.
L. B. Paxson, Eng. of Mach ... Reading, Pa.
John H. Rankin, M. C. B ... Reading, Pa.
No. Pa. & B. Brk. Div.: I. A. Sweigard, Supt., and
Jackson Richards, M. M ... Philadelphia, Pa.
C. & W. Br.: D. C. Reinhart, Sup. Williamsport, Pa.
W. H. Ellis, M. M ... Catawissa, Pa.
C. D. Ellis, M. C. B ... Catawissa, Pa.
Leb. & Tr. Br.: H. W. Tracy, Supt. Pine Grove, Pa.
Coal Br.: J. H. Olhausen, Supt. Mahony Plane, Pa.
R. & C. Br.: A. M. Wilson, Supt ... Columbia, Pa.
P. N. & N. Y. Rd.: W. M. Geary, S. Morristown, Pa.
S. & Le. Rd.: E. Dale, Supt ... Reading, Pa.
Pittsburg, Bradford & Buffalo Ry. 3 g. 31 m. 4 lo. 79c
J. M. Dickey, Gen. Man ... Foxburg, Pa.
M. Mandeville, Supt ... Foxburg, Pa.
Pittsburg, Cincinnati & St. Louis Ry. (See Penna. Co.)
Pittsburg, Ft. Wayne & Chicago Ry. (See Penna. Co.)
Pittsburg Southern Ry. 3 g. 38 m. 4 lo. 64 cars.
Supt. & P. A ... Pittsburg, Pa.
W. S. Marshall, M. M ... Pittsburg, Pa.
E. B. Gosline, M. C. B ... Pittsburg, Pa.
Pitts. & Castle Shannon R. R. 3-4 g. 9 m. 5 lo. 388 c.
James M. Bailey, Gen. Supt ... Pittsburg, Pa.
A. C. Hays, Supt ... Pittsburg, Pa.
Holmes Ward, M. M ... Castle Shannon, Pa.
Wm. E. Long, M. C. B ... Pittsburg, Pa.
Pitts. & Lake Erie R. R. 4-8½ g. 70 m. 30 lo. 1,688 c.
W. C. Quincy, Gen. Man ... Pittsburg, Pa.
R. W. Jones, Mast. Trans ... Pittsburg, Pa.
S. W. Haines, M. M ... Pittsburg, Pa.
Pittsburg & Western R. R. 3 g. 47 m. 2 lo. 76 cars.
E. K. Hyndman, Gen. Man ... Pittsburg, Pa.
C. P. Ford, Pur. Agt ... Allegheny, Pa.
W. L. Hofecker, M. M ... Zelienople, Pa.
Port Huron & No.-Western Ry. 3 g. 105 m. 4 lo. 66 c.
H. McMorran, G. Man. & P. A. Port Huron, Mich.
I. R. Wadsworth, Supt ... Port Huron, Mich.
Chas. Deifenbaugh, M. M ... Port Huron, Mich.
Benj. Hillier, M. C. B ... Port Huron, Mich.
Port Royal & Augusta Ry. 5 g. 112 m. 13 lo. 235 c.
J. N. Bass, Gen. Supt ... Augusta, Ga.
Geo. Riley, M. M ... Port Royal, S. C.
J. H. Milton, M. C. B ... Port Royal, S. C.
Portland & Ogdensburg. 4-8½ g. 114 m. 9 lo. 289 c.
J. Hamilton, Gen. Supt. & P. A ... Portland, Me.
Geo. H. Poor, M. M ... Portland, Me.
W. G. Brewer, M. C. B ... Portland, Me.
Portland & Rochester R. R. 4-8½ g. 52 m. 7 lo. 230 c.
J. W. Peters, Supt. & Pur Agt ... Portland, Me.
E. H. C. Tompson, For. of Mach ... Portland, Me.
David Dow, For. of Car Repairs. Portland, Me.
Potomac, Fred.'g & Pied. R. R. 3 g. 38 m 2 lo. 32 c.
W. M. Crafton, Supt ... Fredericksburg, Va.
Pough., Hart. & Bos. R. R. 4-8½ g. 45 m. 4 lo. 64 c.
J. A. Perkins, Supt ... Poughkeepsie, N. Y.
John L. Driscoll, M. M ... Poughkeepsie, N. Y.
Prince Edward Island Ry. 3-6 g. 199 m. 17 lo. 280 c.
L. B. Archibald, Supt. & Pur. Agt.;
Jos. Unsworth, M. Supt. & Storekeeper; and
D. M. Fraser, M. C. B ... Charlottetown, P. E. I.
Prov., Warren & Bristol R. R. 4-8½ g. 19 m. 5 lo. 38 c.
Waterman Stone, Supt ... Providence, R. I.
Rufus Smith, M. M. & C. B ... Bristol, R. I.
Prov. & Springfield R. R. 4-8½ g. 23 m. 3 lo. 83 c.
Wm. Tinkham, Gen. Man ... Providence, R. I.
G. T. Richardson, M. M ... Providence, R. I.
Prov. & Worcester. 4-8½ g. 66 m. 30 lo. 858 c.
W. E. Chamberlain, Supt ... Providence, R. I.
A. Griggs, Supt. L. & C. D ... Providence, R. I.
Pul'man's Palace Car Co. 472 passenger cars.
A. B. Pullman, 2d V.-Pr. & G. M ... Chicago, Ill.
Geo. F. Brown, Gen. Supt ... Chicago, Ill.
Wm. A. Angell, Pur. Agt ... Chicago, Ill.
S. W. Bretzfield, Asst. Pur. Agt. New York, N. Y.
A. Rapp, Man. (Chicago Works) ... Chicago, Ill.
H. L. Spaulding, Man. (Det Shops). Detroit, Mich.
E. A. Benson, Supt. Shops ... St. Louis, Mo.

Q

Quebec Central Ry. 4-8½ g. 139 m. 3 lo 79 cars.
A. Steele, Supt ... Sherbrooke, Que.
R. D. Morkill, Pur. Agt ... Sherbrooke, P. Q.
Jas. Seiveright, M. M ... Sherbrooke, P. Q.
Quebec, Montreal, Ottawa & Occidental Ry.
4-8½ g. 329 miles, 34 loco. 556 cars.
L. A. Senecal Gen. Supt ... Montreal, Can.
W. E. Blumhart, Pur. Agt ... Montreal, Can.
A. Davis, Mech. Supt ... Montreal, Can.
Quebec & Lake St. John Ry. 4-8½ g. 24 m. 3 lo. 43 c.
J. G. Scott, Manager ... Quebec, Can.
Frank Fournier, Supt ... St. Raymond, P. Q.
John T. Eames, M. M ... St. Raymond, P. Q.

R

Raleigh & Augusta Air-Line; Carolina Central;
Raleigh & Gaston R. Rs. 4-8½ g. 436 m. 48 lo. 978 c.
John C. Winder, Gen. Man ... Raleigh, N. C.
Raleigh Rds. 4-8½ g. 194 m. 22 lo. 589 cars.
B. R. Harding, Supt. of Mach. Raleigh, N. C.
R. T. Bishop, M. C. B ... Raleigh, N. C.
Carolina Cen. R.R. 4-8½ g. 242 m. 26 lo. 389 c.
V. Q. Johnson, Gen. Supt ... Wilmington, N. C.
C. H. Roberts, Pur. Agt ... Wilmington, N. C.
James Maglenn, M. of Mach. Laurinburg, N. C.
S. R. Ethridge, M. C. B ... Laurinburg, N. C.
Rensselaer & Saratoga R.R. (See Del. & Hud. Can. Co.)
Rhinebeck & Connecticut. 4-8½ g. 42 m. 5 lo. 85 c.
J. H. Jones, Gen Supt ... Rondout, N. Y.
John Dykeman, M. M ... Rondout, N. Y.
John H. Decker, M. C. B ... Rondout, N. Y.
Richmond, Fredericksburg & Potomac R. R.
4-8½ g. 83 m. 14 lo. 165 cars.
E. T. D. Myers, Gen. Supt ... Richmond, Va.
T. L. Courtney, Pur. Agt ... Richmond, Va.
H. Khun, M. M ... Richmond, Va.
W. H. Trainham, M. C. B ... Richmond, Va.
Richmond & Alleghany R.R. 4-9 g. 250 m. 18 lo. 771c.
Gen. Man ... Richmond, Va.
Geo. W. Agee, Supt ... Richmond, Va.
J. P. Williams, Pur. Agt ... Richmond, Va.
Geo. D. Harris, M. M. & C. B ... Richmond, Va.
Richmond & Danville R. R. Co.'s Roads.
1,655 miles 217 loco. 3,616 cars.
T. M. R. Talcott, Gen. Man ... Richmond, Va.
J. P. Minetree, Pur. Agt ... Richmond, Va.
R. D. Wade, Supt. Mo. Po ... Richmond, Va.
(1) Rich. & Dan. R. R. 5 g. 764 m. 131 lo. 2,480 cars.
Peyton Randolph, As. G. Man. Richmond, Va.
Rich. & Dan. Div.: 5 g. 255 m. 79 lo. 1,797 c
Wm. H. Green, Supt ... Richmond, Va.
T. W. Gentry, M. M ... Richmond, Va.
J. B. Vaughan, For. Car Sh ... Richmond, Va.
North Carolina Div. 5 g. 223 m. 22 lo. 268 cars.
A. B. Andrews, Supt ... Raleigh, N. C.
W. H. Turrentine, M. M. Comp'y's Shops, N. C.
J. C. Holt, For. Car Sh. Comp'y's Shops, N. C.

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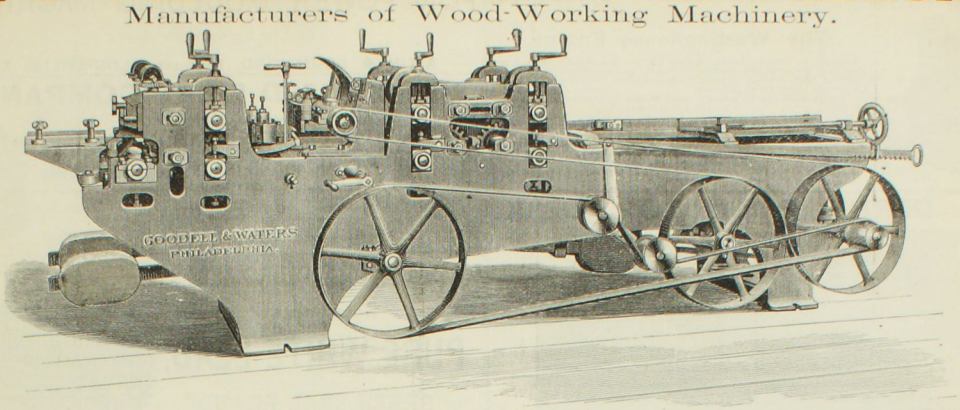
Manufacturers of Wood-Working Machinery.



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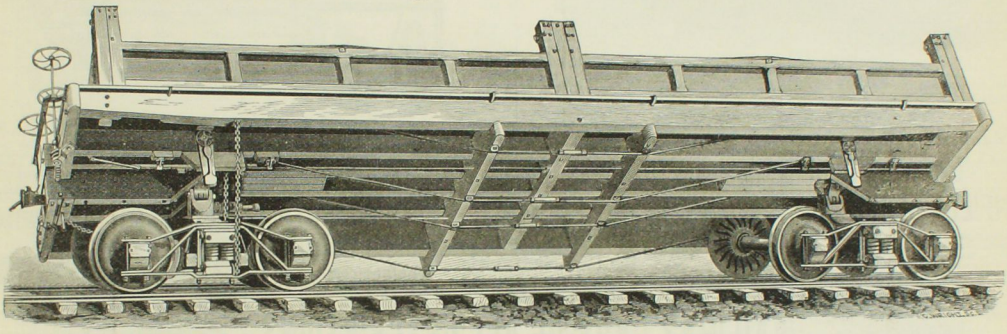

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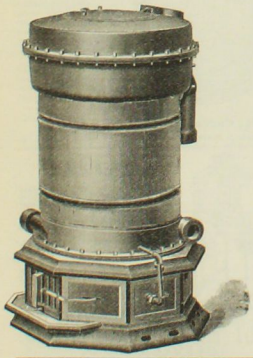
Lehigh Valley Railroad.
Main Central Railroad Co.
Billmeyer & Small Co., York, Pa.
Northern Pacific Railroad Co.
Joliet Steel Co., of Chicago.
Columbus, Hocking Valley & Toledo Railway.
Wells & French Car Co., Chicago.
Cleveland Rolling Mills Co., Cleveland.
John L. Gill, Jr., Car Co., Pittsburgh.
Rock Island & Mercer County Railroad.
Ontario Car Co., London, Ontario Canada.

UNITED STATES CAR COMPANY, 48 CONGRESS STREET, BOSTON, MASS.

THE SALMON CAR HEATER



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The Water Tubes do not come in contact with the Coals, but occupy the Smoke Flue in such a manner as to absorb the greatest amount of heat from Coal in a low state of combustion without danger of chilling the fire.

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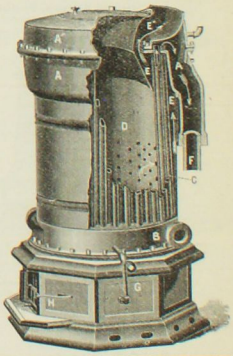

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The best wearing metal for Locomotives and Car Axle Bearings now in use. It is as near Anti-Friction as metal can be made, while it retains all the strength of the Strongest Bronze. It is especially adapted to the use of Railroad Companies, Car and Locomotive Builders and Machinists.

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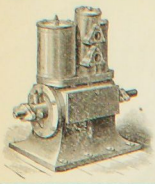
MANUFACTURERS OF



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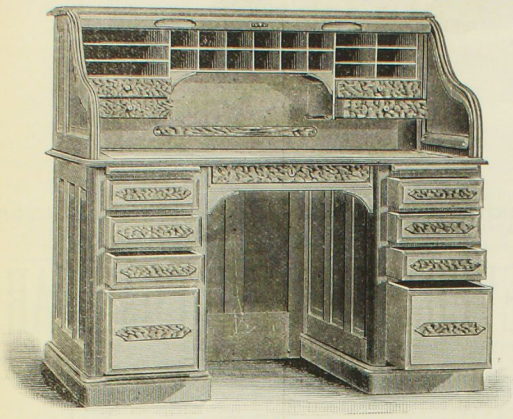

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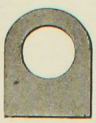

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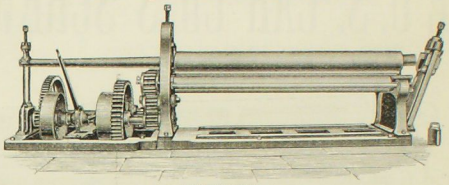
PATENT PLATE BENDING ROLLS.

Built by HILLES & JONES.



DESCRIPTION.

The annexed cut represents all sizes we make to be driven by belt. It will be seen at once that it is but the work of a moment to balance the top roll and lower the hinge housing, to take out the plate when a full circle is bent. The rolls are all made of Solid Wrought Iron, the Balance Bar being a part or extension of the top roll. There is a Cast-Iron Bed-Plate under the entire machine. To save any shifting of belts we put in Friction Pulleys, which enable the rolls to be started, stopped or reversed instantly.

PENFIELD BLOCK CO.

Pulley Blocks and Iron Sheaves, Phosphor-Bronze Self-Lub. Sheaves, Ushers, Giant Car, $5.00 each. Poor's Manual, 1880-81. See p. 53. Please write for lists, prices, etc. LOCKPORT, N. Y.

Eclipse System of Water Supply for Railroads.

ECLIPSE SOLID WHEEL WIND MILLS.

Tested 14 years. Perfectly self-regulating. Conceded by the leading railway companies of this and other countries to be by far the strongest, safest and most powerful wind mill made.

SOLID WHEEL. No Loose Sections.

Frost Proof Tanks

100 to 100,000 Gallons capacity, with all modern appliances.

Outlet Valves, Spouts and Fixtures.

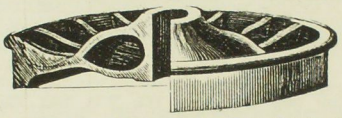
Improved Double-Acting Pumps.

We have furnished over **500** wind mills and **250** complete water stations in 1881 to the leading railroads in the United States and Canadas. Two million feet of tank lumber constantly on hand. Our capacity is such that we can execute large orders promptly. Complete stations erected on trial when desired to test the correctness of our claims. Send for catalogue and price-list.

ECLIPSE WIND ENGINE CO.

W. H. WHEELER, Manager,

BELOIT, WIS.



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SPRINGFIELD, MASS.

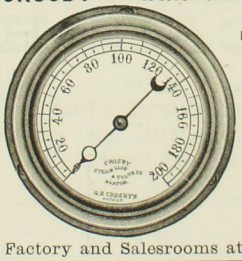
BUILDERS OF

RAILWAY CARS OF ALL DESCRIPTIONS,

CAR WHEELS AND RAILWAY CASTINGS.

H. S. HYDE, Treasurer. G. C. FISK, President.

CROSBY STEAM GAGE & VALVE CO.,



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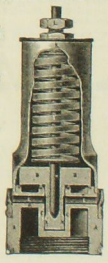
The Crosby Locomotive

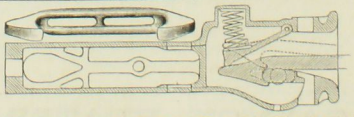
STEAM GAUGES AND POP SAFETY VALVES.

Acknowledged to be the Most Reliable and Durable.

Adopted by the Largest Locomotive Builders and Railroads in the United States.



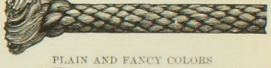
Factory and Salesrooms at 95 & 97 Oliver St., Boston, Mass.



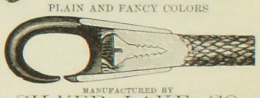
The above cut shows a sectional view of the WAPAKONETA AUTOMATIC CAR-COUPLER AND HOOK. This Coupler can be used where any continuous Draw-bar is used, without incurring any additional expense for change. Cars can be uncoupled without any slack in train. These Couplers are made of the best Refined Air-Furnace Malleable Iron, and Hook of Cast Steel. For further information, address either WAPAKONETA AUTOMATIC CAR COUPLER CO., Wapakoneta, Ohio, Or JOHN COUP, Agent, P. O. Box 29, Cleveland, O.

SOLID BRAIDED

BELL CORD & BELL-CORD COUPLINGS



PLAIN AND FANCY COLORS



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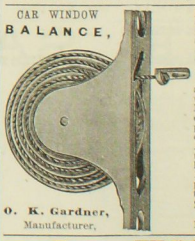
WELLINGTON BROS. & CO., Agents, BOSTON.

CAR WINDOW

BALANCE,



for Passenger Coaches, Sleeping and Parlor Car Windows, consisting of Cone and Coil spring with Wire Cord, balancing the weight of sash. Noiseless in operation, and placed entirely out of sight. Adopted by many of the leading roads. No car complete without them.

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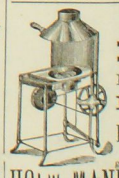

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We offer to Railway Companies the only Exclusively Independent Self-Acting Freight Train Brake which has yet been adopted by any Railway in the World. Our Steam Driver and Tender Brake is acknowledged to be the Simplest and Best Power Brake now in use.

Atlanta & Char. Air Line. 5 g. 286m. 31 lo. 415 c.
Narrow-Gauge Branches. 3 g. 80 m. 5 lo. 37 c.
I. Y. Sage, Supt....Atlanta, Ga.
C. D. Wall, M. M....Atlanta, Ga.
Z. T. Smith, For. Car Sh....Atlanta, Ga.
(2) Charlotte, Col.& Aug. R. R. 5g. 239 m. 22 lo. 287 c.
G. R. Talcott, Supt....Columbia, S. C.
J. H. Green, M. M. (2 roads)...Columbia, S. C.
J. H. Peckins, For. Car Sh....Columbia, S. C.
(3) Columbia & Greenville R. R. 5 g. 297 m. 22 l. 218 c.
J. W. Fry, Supt....Columbia, S. C.
J. O. Meredith, For. E.& C. Rep.. do.
(4) Virginia Midland Ry. 4-8½ g. 353 m. 41 lo 631 c.
W. M. S. Dunn, Eng. & Supt. Alexandria, Va.
J. E. Waddey, M. of M....Alexandria, Va.
J. T. Nalls, M. C. B....Alexandria, Va.
Richmond & Petersburg R.R. 4-8½ g. 25 m. 8 lo. 130 c.
J. R. Kenly, Supt....Richmond, Va.
John O'Brien, M. M....Richmond, Va.
Rio Grande R. R. 3-6 g. 22 m. 3 lo. 39 cars)
M. J. Gomila, Rec. & Gen. Man Brownsville, Tex.
G. W. Rendall, M. M....Brownsville, Tex.
M. Markwood, M. C. B....Brownsville, Tex.
Rochester & Pittsb'g. R.R. 4-8½ g. 108 m. 11 lo. 612 c.
Geo. E. Merchant, Gen. Man...Rochester, N.Y.
J. P. Hovey, M. M....Rochester, N. Y.
Rock Island & Mercer County R. R., and
Rock I'd & Peoria Ry. 4-8½ g. 113 m. 12 lo. 357 c.
R. R. Cable, V.-P. & Gen. Supt..Rock Island, Ill.
R. I. & P. Ry.: H. B. Ludlow, Supt. & P. A. do.
Joseph Elder, M. M....Peoria, Ill.
R. I. & M. C. Rd.: B. T. Cable, Supt. R'k Island, Ill.
J. Parks, M. M....Rock Island, Ill.
Rome (Ga.) R. R. 5 g. 20 m. 2 lo. 13 cars.
Eben Hillyer, Supt....Rome, Ga.
O. W. Harbin, M. M. & C. B....Rome, Ga.
Rome, Watertown & Ogdensburg R. R.
4-8½ g. 409 m. 51 lo. 1,248 cars.
E. A. Van Horne, Gen. Supt....Oswego, N. Y.
Geo. W. B. Cushing, Pur. Agt. New York, N. Y.
Geo. H. Haselton, M. M. & C. B..Oswego, N. Y.
Rumford Falls & Buckfield R.R. 4-8½ g. 29 m. 2 l. 42 c.
O. Hayford, Supt....Canton, Me.
O. Spaulding, Pur. Agt....Buckfield, Me.
E. R. Oldham, M. M....Buckfield, Me.

S

Sabine & East Texas Ry. 4-8½ g. 25 m. 5 lo. 306 c.
J. B. Morford, Gen. Supt....Beaumont, Tex.
R. H. Cousins, Supt....Beaumont, Tex.
Sacramento & Placerville R. R. 4-8½ g. 49 m. 3 lo. 68 c.
J. B. Wright, Supt. & P. A....Sacramento, Cal.
A. J. Stevens M. M....Sacramento, Cal.
Benj. Welch, M. C. B....Sacramento, Cal.
Saginaw Bay & Northw'n R. R. 4-8½ g. 20 miles.
E. W. Gerrish, Supt....Pinconning, Mich.
F. T. Lillot, Pur. Agt....Pinconning, Mich
And. Miller, M. M....Pinconning, Mich.
Saginaw Valley & St. Louis R. R. 4-8½g. 35 m. 4 l. 64 c
N. W. Merrill, Supt....Saginaw, Mich.
Allan Bourn, Pur. Agt....Detroit, Mich.
Geo. C. Watrous, M. M....Iona, Mich.
San Francisco & No. Pac. 4-8½ g. 112 m. 11 lo. 244 c.
Arthur Hughes, Gen. Man..San Francisco, Cal.
H. C. Whiting, Supt....Petaluma, Cal.
P. E. Dougherty, Pur. Agt San Francisco, Cal.
Ed. Reynolds, M. M....Donahue, Cal.
John Martin, M. C. B....Donahue, Cal.
San Luis Obispo & Santa Maria Val. R. R. 3 g. 11 m.
C. A. Haskin, Supt. & P. Agt. San Luis Obispo, Cal.
W. H. Masterman, M. M. San Luis Obispo, Cal.
J. M. Vincent, M. C. B....San Luis Obispo, Cal.
Savannah, Florida & W'n Ry. 5 g. 422 m. 50 lo. 695 c.
H. S. Haines, Gen. Man....Savannah, Ga.
R. G. Fleming, Supt....Savannah, Ga.
A. A. Aveilhé, Pur. Agt....Savannah, Ga.
James D. Hollister, M. of Mach..Savannah, Ga.
Jos. W. Rowell, For. Car Dept. Savannah, Ga.
Sav., Griffin & No. Ala. R. R. Op. by Central (Ga.).
Schuylkill & Lehigh R. R. 4-8½ g. 43 miles.
Elbridge Dale, Supt....Reading, Pa.
Scoharie Valley R. R. (See Middleburg & Sch.)
Scioto Valley R. R. 4-8½ g. 131 m. 15 lo. 460 cars.
Geo Skinner, Supt....Columbus, O
R. Bromley, M. M. & P. A....Portsmouth, O.
Seaboard & Roanoke R. R. 4-8½ g. 80 m. 21 lo. 381 c.
E. G. Ghio, Mast. of Trans....Portsmouth, Va.
M. M. Pendleton, S. M. P. & M. Portsmouth, Va.
Shenandoah Valley R. R. 4-8½ g. 143 m. 15 lo. 104 c.
Henry Fink, Gen. Man....Lynchburg, Va.
J. H. Sands, Supt....Hagerstown, Md.
W. C. De Armond, Pur. Agt..Philadelphia, Pa.
Chas. Blackwell, Supt. of M. P..Roanoke, Va..
Jno. McCallister, M. M..Shepherdstown, W. Va.
H. Groves, M. C. B. Shepherdstown, W. Va.
Shenango & Allegheny R.R. 4-9½ g. 47 m. 6 lo. 156 c.
J. T. Blair, G. Supt. & Pur. Agt. Greenville, Pa.
Edw. Richardson, M. M. & C. B. Greenville, Pa.
Shepaug R. R. 4-8½ g. 38 m. 3 lo. 27 cars.
Edwin McNeill, Supt....Litchfield, Ct.
C. M. Allen, M. M....Litchfield, Ct.
Ship Is., Ripley & Ky. R. R. 3 g. 25 m. 2 lo. 23 cars.
C. L. Harris, Supt. & Pur. Agt....Ripley, Miss.
W. H. Phelps, M. M....Ripley, Miss.
Sioux City & Pacific R. R. 4-8½ g. 427 m. 21 lo. 594 c.
P. E. Hall, Gen. Man. & P. A. Cedar Rapids, Ia.
J. S. Wattles, Supt.... Missouri Valley, Ia.
C. F. McCoy, Asst. Supt....Blair, Neb.
S. A. Teal, M. M....Missouri Valley, Ia.
W. H. Ramseyer, M. C. B. do.
South Carolina Ry. 5 g. 243 m. 42 lo. 685 cars.
John B. Peck, Gen. Man....Charleston, S. C.
S. B. Pickens, Pur. Agt....Charleston, S. C.
P. J. Cochrane, Mast. of Mach. Charleston, S. C.
Geo. H. Gramling, M. C. B....Charleston, S. C.
South-Eastern Ry. 4-8½ g. 161 m. 14 lo. 446 cars.
Bradley Barlow, Gen. Man....St. Albans, Vt.
P. A. McKinnon, Supt....Richford, Vt.
A. G. Eastman, M. M....Richford, Vt.
South Florida R. R. 3 gauge 40 m. 4 lo. 20 cars.
B. R. Swoope, Supt. & P. A....Sanford, Fla.
C. C. Haskell, Pur. Agt....Sanford, Fla.
J. A. Campbell, M. M....Sanford, Fla.
A. D. Stentiford, M. C. B....Sanford, Fla.
South Mountain R. R. 4-8½ g. 18 m. 4 lo. 22 c.
W. H. Woodward, Supt. Pine G've Furnace, Pa.
South Pacific Coast R. R. 3 g. 81 m. 10 lo. 260 cars.
A. H. Fracker, Gen. Supt..San Francisco, Cal.
G. H. Waggoner, Pur. Agt..San Francisco, Cal.
E. L. Reese, M. M. & C. B....Newark, Cal.
South-Western R. R. (Ga.) (See Central of Ga.)
South-Western Ry. (Ky.) 4-8½ g. 4 m. 1 lo. 38 cars.
J. M. Wilson, Supt....Harrodsburg, Ky.
J. Tomlinson, Pur. Agt....Harrodsburg, Ky.
Southern Central R. R. 4-8½ g. 114 m. 16 lo. 447 c.
James G. Knapp, Supt....Auburn, N. Y.
H. D. Titus, Pur. Agt....Auburn, N. Y.
Chas. G. Brown, M. M....Auburn, N. Y.
H. Mooney, M. C. B....Auburn, N. Y.

Southern Maryland R. R. 4-9 g. 47 m.
Shields Burr, Supt....Brandywine, Md.
C. J. Royce, M. M....Brandywine, Md.
Southern Pacific R. R. 4-8½ g. 161 m. 20 lo. 728 c.
Northern Div. (For other Divs. see Cen. Pac.)
A. C. Bassett, Supt....San Francisco, Cal.
J. R. Watson, Pur. Agt....Sacramento, Cal.
J. T. Wilson, M. M....San Francisco, Cal.
F. N. Bellisle, M. C. B....San Francisco, Cal.
Springfield, Effingham & So.-Eastern and
Bloomfield Rys. 3 g. 89 m.
W. C. Lyon, Gen. Man....Robinson, Ill.
E. Pratt Buell, Pur. Agt....Effingham, Ill.
J. S. Pickering, M. M. & C. B....Effingham, Ill.
Spring Hill & Parrsboro Ry. 4-8½ g. 32 m. 1 lo. 64 c.
J. Killam, Supt....Parrsboro, N. S.
K. McKinnon, M. M....Parrsboro, N. S.
St. Croix & Penobscot R. R. 4-8½ g. 22 m. 4 lo. 195 c.
S. W. Haycock, Supt. & Pur. Agt. .Calais, Me.
G. H. Corsen, M. M....Milltown, Me.
H. C. Tincker, M. C. B....Milltown, Me.
St. John & Maine Ry. 4-8½ g. 92 m. 6 lo. 110 cars.
H. D. McLeod, Supt. & P. Agt...St. John, N. B.
A. McIntyre, M. M....St. John, N. B.
St. John's Ry 4-8½ g. 14½ m. 2 lo. 24 cars.
R. McLaughlin, Pr. & Supt. Jacksonville, Fla.
Geo. Ferro, M. of Mach....Tocoi, Fla.
St. Johnsb'ry & Lake Champ 4-8½ g. 120 m 10 lo. 197 c.
A. B. Jewett, Supt. & P. A..St. Johnsbury, Vt.
Geo. E. Howe, M. M. & C. B. St. Johnsbury, Vt.
St. Joseph & Des Moines R. R. (See K. C., St. J. & C. B.)
St. Lawrence & Ottawa Ry, 4-8½ g. 59 m. 10 l. 146 c.
Archer Baker, Gen. Supt....Ottawa, Can.
alvin Dame, M. M. & C. B....Prescott, Can.
St. Louis, Alton & Terre Haute R. R.
Main Line. (See Ind. & St. L. Div.: Ohio Ry.)
St. Louis & Cairo Div.: 4-8½ g 123 m. 16 lo. 778 c.
G. W. Parker, Gen. Man....St. Louis, Mo.
J. L. Hinckley, Supt....Belleville, Ill.
A. M. De Clerq, M. M....St. Louis, Mo.
St. Louis Bridge Co. and Tunnel R. R.
4-8½ g. 17 m. 15 lo. 11 cars.
Wm. Taussig, Gen. Man....St. Louis, Mo.
A. W. Dickinson, Supt....St. Louis, Mo.
J. E. Williams, Jr., Pur. Agt....St. Louis, Mo.
H. M. Smith, M. M....St. Louis, Mo.
St. Louis Coal R. R. 4-8½ g. 28 m. 1 lo. 78 cars.
Jas. Prentice, Supt....Carbondale, Ill.
Jas. C. Bryden, Pur. Agt....St. Louis, Mo.
St. Louis, Ft. Scott & Wichita R. R. 4-8½ g. 20 miles.
F. Tiernan, V. P. & Gen. Man..Fort Scott, Kan.
J. D. Hill, Gen. Supt....Fort Scott, Kan.
S. C. Young, M. M....Ft. Scott, Kan.
A. A. Lydell, M. C. B....Ft. Scott, Kan.
St. L., Hannibal & Keokuk. 4-8½ g. 59 m. 1 lo. 23 c.
W. W. Walker, Supt....Hannibal, Mo.
Geo. Douglass, Pur. Agt....Hannibal, Mo.
St. Louis, Iron Mountain & Southern Ry. (1);
International & Great Northern R. R. (2); and
Texas & Pacific Ry. (3).
4-8½ g. 2,678 m. 302 lo. 6,119 cars.
H. M. Hoxie, Gen. Man....St. Louis, Mo.
R. B. Lyle, Gen. Pur. Agt....St. Louis, Mo.
(1) St. L., I. Mt. & So. 4-8½ g. 710 m. 137 lo. 4,081 c.
Wm. Kerrigan, Supt....St. Louis, Mo.
O. A. Haynes, Supt. Mach....De Soto, Mo.
Oscar Doolittle, M. C. B....St. Louis, Mo.
St. Louis Div.: J. J. Frey, Supt....St. Louis, Mo.
W. H. Harris, M. M....De Soto, Mo.
Ark. Div.: Wm. Kerrigan, Supt. Little Rock, Ark.
R. M. Richardson, M. M. & C. B. do.
(2) Inter. & Gr't No'n R. R. 4-8½ g. 776 m. 45 lo 932 c.
Jos. Herrin, Supt....Palestine, Tex.
R. H. Johnson, M. M....Palestine, Tex.
H. H. Sessions, M. C. B....Palestine, Tex.
(3) Texas & Pac. Ry. 4-8½ g. 1,030 m. 120 lo. 1,106 c.
E. L. Dudley, Supt....Marshall, Tex.
J. F. Sechler, Gen. M. M....Marshall, Tex.
H. H. Sessions, M. C. B....Marshall, Tex.
So'n Div.: Hugh Irvine, Supt....Longview, Tex.
W. Garrison, M. M....Marshall, Tex.
Tr. Con. Div.: J. L. Thorn, Supt. Texarkana, Ark.
Wilson Garrison, M. M....Texarkana, Ark.
W'n Div.: Wm. Davis, Supt....Ft. Worth, Tex.
W. H. Reilly, Asst. G. M. M. Fort Worth, Tex.
St. L. Keokuk & No.-W'n. 4-8½ g. 187 m. 14 lo 312 c.
J. W. Smith, Gen. Supt. & P. Agt...Keokuk, Ia.
Wm. H. Bartlett, M. M....Keokuk, Ia.
St. L., Salem & Little Rock. 4-9 g. 69 m. 5 lo. 103 c.
H. A. Crawford, V. Pr. & P. A...St. Louis, Mo.
E. B. Sankey, Supt....Salem, Mo.
Thomas Everson, M. M....Steelville, Mo.
J. W. Houston, M. C. B....Steelville, Mo.
St. L., Van. & T. H. (See T. H. & I. Div. of Penna. Co.)
St. Louis & Cairo R. R. 3 g. 146 m. 22 lo. 708 cars.
Chas. Hamilton, Gen. Supt....St. Louis, Mo..
R. M. Pringle, M. M....East Carondelet, Ill.
St. L. & San Fran. Ry. 4-8½ g. 695 m. 71 lo. 2,490 c.
C. W. Rogers, 2d V. Pr & G. Man..St. Louis, Mo.
D. H. Nichols, Mast. Tran..No. Springfield, Mo.
A. G. Thompson, Pur. Agt....St. Louis, Mo.
M. Kearney, M. M. & C. B....St. Louis, Mo.
Mo. & Ark. Div.: W. A. Thoms, Supt. do.
Kan. Div.: J. R. Wentworth, Supt. Neodesha, Kan.
St. Martin's & Upham Ry. 4-8½ g. 30 m. 1 lo.
A. E. Killam, Manager....St. Martin's, N. B.
St. Paul, Minneapolis & Manitoba Ry.
4-8½ g. 1,050 m. 116 lo. 3,116 cars.
A. Manvel, Gen. Man....St. Paul, Minn.
H. C. Atkins, Gen. Supt....St. Paul, Minn.
E. B. Wakeman, Supt. Trans....St. Paul, Minn.
J. C. Morrison, Pur. Agt....St. Paul, Minn.
H. Middleton, M. M. & C. B....St. Paul, Minn.
Breck. Div.: A. Guthrie, Supt....St. Paul, Minn.
F. F. Div.: J. B. Rice, Supt....St. Paul, Minn.
No'n Div.: D. K. Smith, Supt....Crookston, Minn.
St. Paul & Duluth R.R. 4-8½ g. 196 m 24 lo. 580 c.
S. R. Stimson, Gen. Supt....St. Paul, Minn.
J. G. Callahan, Pur. Agt....St. Paul, Minn.
W. McFarland, M. M....St. Paul, Minn.
John Hill, M. C. B....St. Paul, Minn.
Sterling Mountain Ry. 6 g. 8 m. 2 lo. 145 cars.
J. C. Missimer, Supt....Sloatsburg, N. Y.
Syracuse, Binghamton & N. Y. R. R. (See D. L. & W.)
Syracuse, Chenago & N. Y. 4-8½ g. 44 m. 4 lo. 60 c.
Albert Allen, Supt....Syracuse, N. Y.
George W. West, M. M....Syracuse, N. Y.
Wm. J. McMichael, M. C. B....Syracuse, N. Y.
Syracuse, Geneva & Corning; Corning, Cowanasque
& Antrim R. Rs. 4-8½ g. 121 m. 23 lo. 1,044 c.
A. H. Gorton, Supt....Corning, N. Y.
Andrew Beers, Pur. Agt....Corning, N. Y.
O. C. Patchell, M. M....Corning, N. Y.
C. J. Butler, M. C. B....Corning, N. Y.

T

Terre Haute & So.-Eastern Ry. 4-9 g. 40 miles.
Geo. Atherton, Supt....Terre Haute, Ind.

Texas-Mexican; and Mexican National Rys.
3 g. 333 m. 28 lo. 600 cars.
G. C. Gardner, Gen. Man....New York, N. Y.
A. R. Roberts, Pur. Agt....New York, N. Y.
S. T. Fuller, Gen. Supt....Corpus Christi, Tex.
P. J. Milan, M. M. & C. B. do.
Mex. Nat. Ry.: J. C. Monroe, M. M. Mexico, Mex
Texas Western Ry. 3 g. 42 m. 2 lo. 34 cars.
J. W. Goodwin, Supt....Houston, Tex.
T. F. Glispin, M. M....Houston, Tex.
Texas & New Orleans; Louisiana W'n R. Rs.
4-8½ g. 217 m. 25 lo. 900 c.
J. F. Crosby, Gen. Man....Houston, Tex.
P. B. Watson, Pur. Agt....Houston, Tex.
C. A. Burton, Supt....Houston, Tex.
D. C. Smith, M. M....Houston, Tex.
J. M. Mather, M. C. B....Houston, Tex.
Texas & St. Louis Ry. 3 g. 258 m. 15 lo. 280 cars.
J. B. Van Dyne, Gen. Supt....Tyler, Tex.
F. W. Paramore, Pur. Agt....St. Louis, Mo.
L. B. Fisher, Pur. Agt....Tyler, Texas.
W. J. Lewis, M. M....Tyler, Tex.
Tioga and Elmira State Line R. Rs.
4-8½ and 6 g. 54 m. 17 lo. 953 cars.
L. H. Shattuck, Supt....Blossburg, Pa.
James A. Drake, Pur. Agt....Elmira, N. Y.
Pere Bonny, M. M....Blossburg, Pa.
D. H. Stratton, M. C. B....Blossburg, Pa.
Toledo, Ann Ar. & Gr. Tr. Ry. 4-8½ g. 84 m. 7 lo. 107 c.
M. D. Woodford, Gen. Man..Ann Arbor, Mich.
H. W. Ashley, Supt. & Pur. Agt. do
C. C. Dodge, M. M....Ann Arbor, Mich.
Toledo, Delphos & Burl. R. R. 3 g. 422 m. 21 lo. 694 c.
T. A. Phillips, Gen. Man....Toledo, O.
J. H. F. Wiers, Supt. Mach. & P. Agt Toledo, O.
Tol. & Day. Div.: A. M. Matheany, Supt.; and
A. T. Stewart, M. M....Delphos, O.
S.-E'n Div.: R. B. Jones, Supt....Dayton, O.
F. McCreary, M. M....Dayton, O.
Tonawanda Valley R. R. 3 g. 19 m. 1 lo. 13 cars.
J. V. D. Loomis, Supt....Attica, N. Y.
Toronto, Grey & Bruce Ry. 4-8½ g. 191 m 20 lo 446 c.
Edmund Wragge, Gen. Man....Toronto, Can.
W. Watson, Pur. Agt....Toronto, Can.
David Preston, M. M....Toronto, Can.
Troy & Boston R. R. 4-8½ g. 48 m. 20 lo. 484 cars.
D. Robinson, Pres. & Pur. Agt....Troy, N. Y.
Joseph Crandell, Supt....Troy, N. Y.
Z. B. Davis, M. M....Troy, N. Y.
R. V. Coon, M. C. B....Troy, N. Y.
Tuckerton R. R. 4-8½ g. 31 m. 2 lo. 28 cars.
J. J. Pharo, Supt....Tuckerton, N. J.

U

Ulster & Delaware R. R. 4-8½ g. 74 m. 7 lo. 142 cars.
Jas. H. Jones, Supt....Rondout, N. Y.
Geo. W. Wright, M. M....Rondout, N. Y.
John H. Decker, M. C. B....Rondout, N. Y.
Union Pacific Ry. (4 Gen. Divs.)
3 & 4-8½ g. 4,270 m 318 lo. 6,157 cars.
S. H. H. Clark, Gen. Man....Omaha, Neb.
Thos. L. Kimball, Asst. Gen Man. Omaha, Neb.
A. D. Clarke, Pur. Agt....Omaha, Neb.
(1) Union Div.: Gen Supt...Omaha, Neb.
I. H. Congdon, Gen. M. M....Omaha, Neb.
Geo. E. Stevens, Supt. Car Dept. Omaha, Neb.
East. Divs.: P. J. Nichols, Supt....Omaha, Neb.
Robt. McConnell, M. M....Omaha, Neb.
A. M. Collett, M. C. B....Omaha, Neb.
Jas. H. McConnell, M. M....No. Platte, Neb.
A. Reis, For. Car. Sh....No. Platte, Neb.
Mtn. Div.: Robt. Law, Supt....Cheyenne, Wy. T.
T. A. Davies, M. M....Cheyenne, Wy. T.
J. E. Davies, For. Car. Sh. Cheyenne, Wy. T.
Lar. Div.: E. Dickinson, Supt...Laramie, Wy. T.
R. Galbraith, M. M....Laramie, Wy. T.
R. M. Galbraith, M. M....Rawlins, Wy. T.
Frank Blake, For. Car. Sh...Rawlins, Wy. T.
West. Div.: W. B. Doddridge, Supt. Evanston, Wy T.
C. C. Quinn, M. M....Evanston, Wy. T.
R. V. Brinkley, For. Car. Sh. Evanston, Wy. T.
Utah Nor. Div.: G. W. Thatcher, Supt., Logan, U.
R. Craft, M. M....Logan, U.
F. Reardon, M. M....Eagle Rock, Idaho.
F. M. Shoemaker, For. Car. Sh. Eagle R'k, Ida.
Col. Div.: A. A. Egbert, Supt....Denver, Col.
Fred. Metzheimer, M. M....Golden Col.
E. G. Thomas, For. Car. Sh....Golden, Col.
St. J. & W'n. Rd.: L. D. Tuthill, Supt. St. Joseph, Mo.
E. Sleppy, M. M....Grand Island, Neb.
E. Hansen, For. Car. Sh....Elwood, Kan.
(2) Kansas Div.: S. T. Smith, G. Supt. Kansas C'y, Mo.
Jno. Mackenzie, Supt. Mach. Armstrong, Kan.
T. B. Roberts, M. C. B....Armstrong, Kan.
K. Val. Div.: J. O. Brinkerhoff, Supt. Kan. C'y, Mo.
Jas. Mackenzie, M. M....Armstrong, Kan.
Smoky Hill & Denver Divs.:
O. H. Dorrance, Supt....Wallace, Kan.
J. B. Dailey, M. M. (S. H. Div.)....Ellis, Kan.
Chey. Div.: A. A. Egbert, Supt....Denver, Col.
R. McDougall, M. M. (D. & C. Divs) Denver, Col.
W. Ogle, For. Car. Sh. (D. & C. Divs.) do.
Kan. Cen. Div.: 3 g. 150 miles.
W. J. Kelley, Supt....Leavenworth, Kan.
And. Goldthwaite, M. M..Leavenworth, Kan.
J. P. Newman, M. C. B....Leavenworth, Kan.
(3) Denver & South Park Div. 3 ft. gauge 227 miles.
C. W. Fisher, Gen Supt....Denver, Col.
J. H. Kirk, M. M....Denver, Col.
(4) Nevada Central Ry. 3 g. 93 m. 5 lo. 82 cars.
F. W. Dunn, Supt....Battle Mountain, Nev.
Z. T. Spriggs, M. M....Battle Mountain, Nev.
United States Rolling Stock Co. 23 lo. 4,834 cars.
A. Hegewisch, Pres....New York, N. Y.
C. F. Jauriet, Gen. M. M. & P. A..Chicago, Ill.
Utah Central Ry. 4-8½ g. 280 m.
John Sharp, Gen. Supt...Salt Lake City, Utah.
S. H. Hill, Pur. Agt....Salt Lake City, Utah.
W. B. Armstrong, M. M..Salt Lake City, Utah.
Peter Reid, M. C. B....Salt Lake City, Utah.
Utah & Nevada Ry. 3 g. 37 m.
W. W. Ritter, Gen. Man...Salt Lake City, Utah.
Robert Anderson, M. M...Salt Lake City, Utah.
Utah & Pleasant Valley Ry. 60 m.
G. M. Young, Man....Salt Lake City, Utah.
Utica, Ithaca & Elmira Ry. 4-8½ g. 127 m. 11 lo. 152 c.
G. Jas. Rice, Pres & Supt .Horse Heads, N. Y.
J. L. Greatsinger, Pur. Agt....Breesport, N. Y.
Geo. W. Cleveland, M. M....Breesport, N. Y.
Wm. Ells, M. C. B....Breesport, N. Y.
Utica, & Black Riv. R. R. 4-8½ g. 180 m. 22 lo. 329 c.
J. F. Maynard, Gen. Supt. & P. A..Utica, N. Y.
John Bailey, M. M....Utica, N. Y.
David James, M. C. B....Utica, N. Y.

V

Vaca Vall. & Clear Lake R. R. 4-8½ g. 30 m. 2 lo. 19 c.
G. B. Stevenson, Gen. Supt....Vacaville, Cal.

Valley Ry. 4-8¾ g. 59 m. 10 lo. 317 cars.
Samuel Briggs, Supt....Cleveland, O.
B. C. Bosworth, M. M....Cleveland, O.
Chas. Blanchard, M. C. B....Cleveland, O.
ernon, Greensburg & Rushville R. R. 25 m.
Horace Scott, V.-Pres....Greensburg, Ind.
Virginia Midland Ry. (See Rich. & Dan.)
Virginia & Truckee R. R. 4-8½ g. 54 m. 17 lo. 375 c.
Carson & Colorado R. R. 3 g. 150 m. 4 lo. 76 c.
H. M. Yerington, Gen. Supt....Carson, Nev.
R. J. Laws, Supt. (C. & Co.)....Carson, Nev.
C. P. Mason, Pur. Agt....Carson, Nev.
I. N. Fording, M. M....Carson, Nev.
B. F. Lyon, M. C. B....Carson, Nev.

W

Wabash, Chester & W'n R. R. 4-8½ g. 42 m. 2 lo. 32 c
J. L. Hinckley, Gen. Supt....Chester, Ill
Wabash, St. Louis & Pacific Ry. (3 Gen. Divs.)
4-8½ g. 3,241 m. 559 lo. 17,230 cars.
John C. Gault, Gen. Traffic Man. St. Louis, Mo.
Robert Andrews, Gen. Supt....St. Louis, Mo.
Asst. Gen. Supt....St. Louis, Mo.
R. W. Green, Pur. Agt....St. Louis, Mo.
Jacob Johann, Gen. M. M....Springfield, Ill.
U. H. Kohler, Gen. M. C. B....Toledo, O.
(1) Eas'n Div.: J. B. Barnes, M. M. Fort Wayne, Ind.
U. H. Kohler, Gen. M. C. B....Toledo, O.
G. W. Stevens, Supt....Fort Wayne, Ind.
Ohio & Ind. Div.:
Peru Div.: E. C. Murphy, Supt....Peru, Ind.
John McKenna, M. M....Peru, Ind.
Cairo Div.: D. G. Moore, Supt....Cairo, Ill
A. Van Tuyl, M. M....Carmi, Ill
(2) Middle Div.: J. Johann, Gen. M. M. Springfield, Ill.
R. M. Hemphill, M. C. B....Peoria, Ill
Ill. Div.: H. F. Clark, Supt....Springfield, Ill.
B. B. Rose, M. C. B....Decatur, Ill.
Chicago Div.: A. A. Hobart, Supt....Chicago, Ill
Peoria Div.: F. L. Tomkins, Supt....Peoria, Ill
Wm. O. Hewitt, M. M....Peoria, Ill
Rant'l Div.: B. F. Mathias, Supt....Rantoul, Ill.
J. McCarthy, M. M....Rantoul, Ill.
(3) Western Div.: W. H. Selby, M. M...Moberly, Mo.
C. S. Buck, M. C. B....Moberly, Mo
Missouri Div.: R. S. Miner, Supt....Moberly, Mo.
C. B. & O. Div.: J. W. Blanchard, Supt.; and
J. S. Hazen, M. C. B....Stanberry, Mo.
Quincy Div.: F. D. Schermerhorn, S..Quincy, Ill.
Iowa Div.: E. N. Armstrong, Supt....Keokuk, Ia.
D. Moin. Div.: H. B. Skeele, Supt. Des Moines, Ia.
Walla Walla & Columbia Riv. R. R. (See Ore. Ry.)
Walkill Ry. 4-8½ g. 117 m. 9 lo. 169 cars.
G. H. Graves, Supt....Rondout, N. Y.
J. B. Dykeman, M. M....Rondout, N. Y.
John H. Decker, M. C. B....Rondout, N. Y.
Warwick Valley R. R. 4-8½ g. 28 m. 2 lo. 18 cars.
Grinnell Burt, Pres. & Pur. Agt. Warwick, N. Y.
S. Mills, M. M....Warwick, N. Y.
Washington & Western R. R. 4-8½ g. 52 m. 5 lo. 83 c.
R. H. Havener, Gen. Supt....Alexandria, Va.
Edward Dunn, M. M....Alexandria, Va
John Harrison, M. C. B....Alexandria, Va.
Waynesburg & Washington Rd. 3 g. 28 m. 3 lo. 15 c.
J. G. Ritchie, Supt....Waynesburg, Pa.
G. E. Huggins, M. C. B....Waynesburg, Pa.
Welland Ry. 4-8½ g. 25 m. 3 lo. 147 cars
William Pay, Supt....St. Catharines, Ont
Jas. Taylor, M. M....St. Catharines, Ont
Wm. H. Pay, M. C. B....St. Catharines, Ont
West End Narrow Gauge Ry. 3 g. 16 m
Rolla Wells, Supt....St. Louis, Mo
M. M. Hodgman, M. M....Florissant, Mo.
West Feliciana R. R. 4-8½ g. 27 m. 2 lo. 22 cars
J. B. McGehee, Pr. & Gen. Supt. Bayou Sara, La.
J. A. Tilton, M. M. & C. B....Bayou Sara, La.
West Virginia, Central & Pittsb'g Ry. 13 m 3 lo. 19 c.
W. E. Porter, Gen. Supt....Piedmont, W. Va.
W. T. Blackiston, Pur. Agt....Piedmont, W. Va.
E. W. Lippencott, M. M. & M. C. B..Piedmont.
Western R. R. (of Ala.) 5 g. 88 m. 15 lo. 270 cars.
Atlanta & W. Point Rd. 5 g. 87 m. 14 lo. 20 c.
Cecil Gabbett, Gen. Man. & Supt...Mont., Ala.
Robert King, M. M....Montgomery, Ala.
F. M. Wade, M. C. B....Montgomery, Ala.
Western Counties' Ry. 4-8½ g. 67 m. 8 lo. 137 cars.
J. Brignell, Supt....Yarmouth, N. S.
Western Maryland R. R. 4-8½ g. 157 m. 16 lo. 394 c.
J. M. Hood, Pr. & Gen. Man....Baltimore, Md.
R. J. Adair, Pur. Agt....Baltimore, Md.
David Holtz, Mast. of Mach..Union Bridge, Md.
J. H. Nussear, M. C. B....Union Bridge, Md
Western No. Carolina R. R. 4-8½ g. 155 m. 6 lo. 36 c.
V. E. McBee, Supt....Salisbury, N. C.
Geo. P. Erwin, Pur. Agt....Salisbury, N. C.
G. W. Gates, M. M....Salisbury, N. C.
Western & Atlantic R. R. 5 g. 138 m. 48 lo. 952 c.
R. A. Anderson, Gen. Supt....Atlanta, Ga.
W. R. Webster, Pur. Agt....Atlanta, Ga.
John H. Flynn, M. M....Atlanta, Ga.
W. G. Gramling, M. C. B....Atlanta, Ga.
Wheeling & Lake Erie R. R. 143 miles.
J. S. Oliver, Gen. Man. & Supt....Norwalk, O.
L. James, Supt. Mach. & Car Dept. do.
White Water R. R. (See Ft. W., Cin. & Lou.)
Wilmington & No'n R. R. 4-8¾ g. 77 m. 13 lo. 148 c.
J. H. Thompson, Supt. & P. A..Coatesville, Pa.
George Rommel, M. M....Coatesville, Pa.
Alex. Maitland, M. C. B....Coatesville, Pa.
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5 g. 599 miles 70 locomotives 1,120 cars.
R. R. Bridgers, Gen. Man....Wilmington, N. C.
J. F. Divine, Gen. Supt....Wilmington, N. C.
John Bisset, M. M....Wilmington N. C.
W. H. Day, M. C. B....Florence, S. C.
C. R. Clowe, M. C. B. (W. & W.).Wilmington, N. C.
Windsor & Annapolis Ry. 4-8½ g. 130 m. 10 lo. 156 c.
P. Innes, Gen. Man....Kentville, N. S.
Wm. Yould, M. M....Kentville, N. S.
Wm. Grierson, M. C. B....Kentville, N. S.
Wisconsin Central R. R. 4-8½ g. 480 m 31 lo. 783 c.
F. N. Finney, Gen. Man....Milwaukee, Wis.
J. W. Curtis, Pur. Agt....Milwaukee, Wis.
J. B. Henney, Supt. M. P. & M..Stevens Pt., Wis.
Mil. & E'n Divs.: A. A. Allen, S..Milwaukee, Wis.
W. & No. Div.: G. Campbell, S. Stevens Point, Wis
Worcester & Nashua; and Nashua & Rochester R. Rs.
4-8½ g. 95 m. 20 lo. 505 cars.
C. S. Turner, Pres. & G. Man. Worcester, Mass.
G. W. Hurlburt, Supt....Worcester, Mass.
John G. Brady, M. M. & C. B. Worcester, Mass.
Worcester & Shrewsbury R. R. 3 g. 3 miles.
Worcester & Somerset R. R. 4-8½ g. 10 m. 1 lo. 4 c.
J. J. Coburn, Supt....Worcester, Mass.
G. E. Hapgood, Pur. Agt....Worcester, Mass.
Chas. Cleveland, M. M....Worcester, Mass.

Y

Youghiogheny R. R. 4-9 gauge
Wm. Wilson, Supt....Irwin's, Pa.

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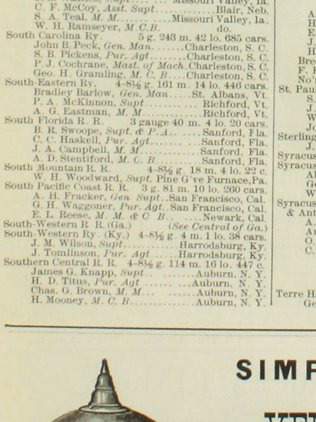

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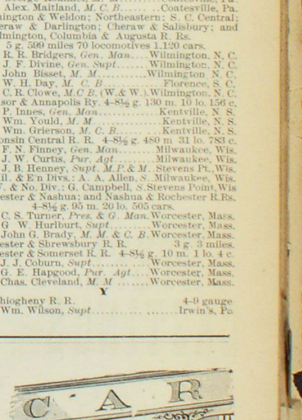

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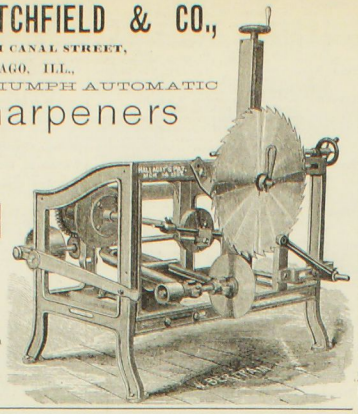

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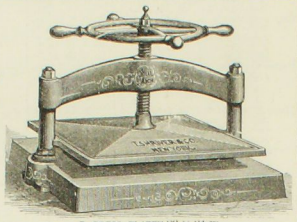

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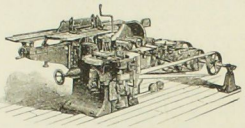

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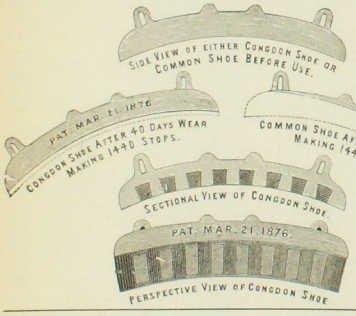

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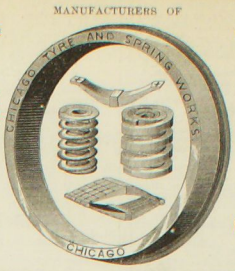

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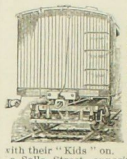

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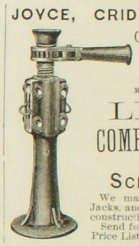

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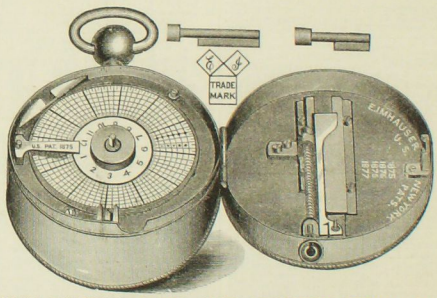

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☞ BEWARE OF INFRINGEMENTS. ☜

WITH SAFETY LOCK ATTACHMENT SUPPLIED.

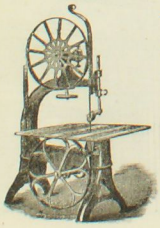
This instrument is supplied with 12 different keys for 12 stations in or outside of the buildings. Invaluable for all concerns employing night watchmen.

In these instruments, the marking apparatus is in the cover of the case, the watch movement is separate, and therefore, saved from dust entering the key-hole. By other Watch Clocks, pricking holes, the marking springs are in the case with the watch movement, and, of course, produce great trouble and expense.

N. B.—The IMHAUSER referred to by BUERK in his advertisement and circulars, and special notice in this paper, *Western Railroad Association* and *Easter Railroad Association*. It means the late firm of IMHAUSER & Co., consisting of three other different persons, which Detector is called HAHN-MEYER'S, patented July 25, 1871 (not Imhauser's). The sale of said Time Director of 1871 being forbidden by injunction (1874), none of them are now offered for sale, and, therefore, J. E. Buerk is *wrong* in not making known the truth and real facts by mentioning the full name of the different other persons. A question at the law about the Patent rights on both of the Patents of 1865, from J. E. Buerk, and the other 1871, Hahnmeyer's was begun in 1872. The firm E. Imhauser, New York, was established 1875, and my Watchman's Time Detectors are latter patented in 1875, 1876, 1876, 1877, 1880, 1881, 1882, and claim improved combination. These Watchman's Time Detectors are of an entirely new and different construction from all others, and are sold under the protection of the law of the United States.

May 1, 1882.
P. O. Box 2875.
E. IMHAUSER,
212 Broadway, New York.

BAND SAW.



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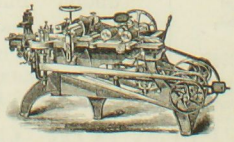

Planers, Vertical Car Tenoners, Gaining, Tenoning, Rotary Mortising Machines.

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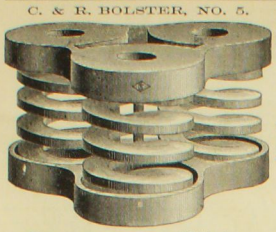

Diameter.....11½ inches.
Height.....6¼ "
Capacity, each spring, 30,000 lbs.

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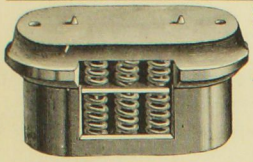

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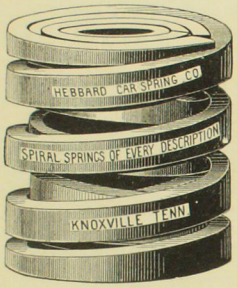

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RICHARD VOSE, President.

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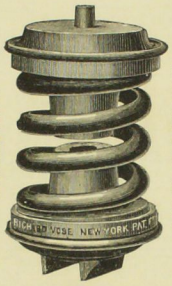

Adapted to a Car-Body Weighting 32,000 Lbs.
Diameter, outside Casting, 8 in.
Height, Bearing to Bearing, 11¼ in.

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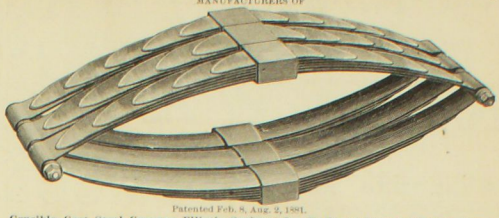

Patented Feb. 8, Aug. 2, 1881.

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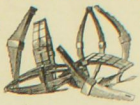

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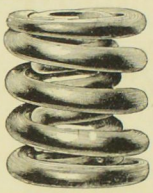

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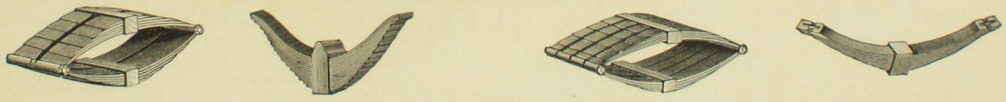

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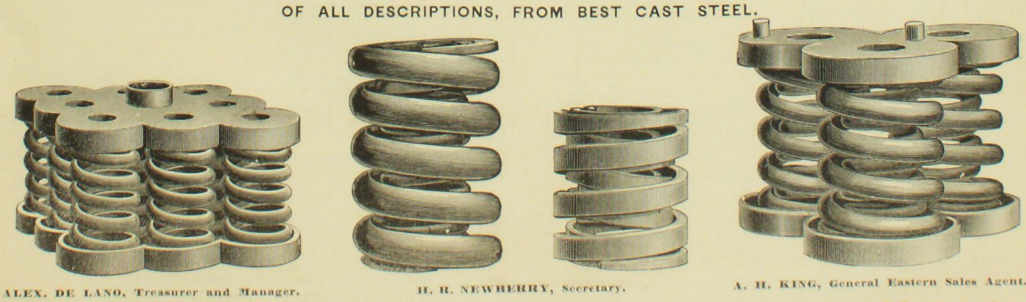

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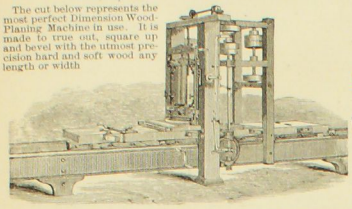

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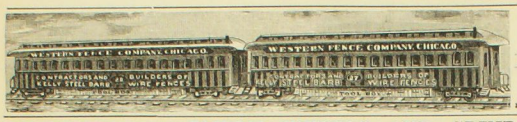

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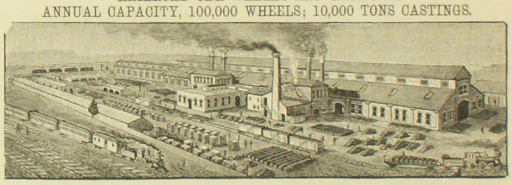

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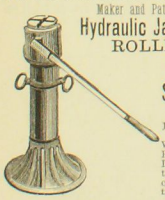

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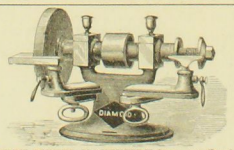

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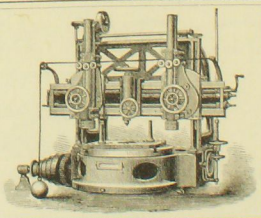

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